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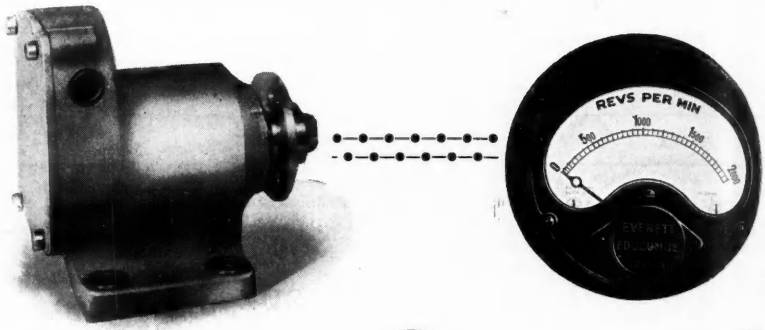

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ELECTRICAL REVIEW

Vol. CXLVI. No. 3787 23RD JUNE, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Power Station Performance

HIGH THERMAL EFFICIENCIES OF BRITISH PLANT

IN view of the major part played by the British Electricity Authority in the Convention we have been attending at Harrogate Spa this week, it is not unnatural that, apart from the presidential address, three of the five papers presented should deal with power station topics. They were read in abstract at the Thursday morning session and discussed together during the afternoon of the same day.

American Comparison

Appropriately, too, attention was directed first to operational aspects. In this respect the only possible comparison is between the United States and the United Kingdom. The pre-war average performance of British stations was better than the American. It deteriorated, not unexpectedly, during and immediately after the war for reasons which are understandable.

The pleasing improvement which has since occurred is steady and continuing. Indeed there may be some justification for claiming that the latest thermal efficiencies announced by the B.E.A. two weeks ago may be even better than they seem—for it is not always clear whether the equivalent United States figures refer to energy generated, or that which is sent out, upon which the British returns are based.

It must not be forgotten that the coal available to British generating stations is appreciably poorer than that burned in American stations, which do not publish average calorific values. It would appear that the difference between the average efficiencies of station performance in the two countries is considerably less when calculated on a lb/kWh delivered instead of the lb/kWh produced basis.

Nevertheless there are signs of a slowing-up of the reduction of losses which account for the difference between the practical and ideal. In fact, so far as this component is concerned, the Battersea "B" station—which heads the list of the most efficient stations—has not yet reached the level attained by the older Battersea "A."

The determined endeavour to raise the thermal efficiency of electricity production in this country has been a hard one. The B.E.A. will continue its "struggle" for it is well aware that the running cost depends as much on the cost of fuel as on the efficiency of plant. Consequently the constant effort to ensure maximum economy means that plant on sites where coal is expensive has to be shut down immediately the loading circumstances permit.

Coal Sampling

The task of the Authority's chemists who have to sample for testing such large quantities of coal which range widely in kind and quality is not an enviable one. The statistical analysis of the mass of individual results must be an enormous undertaking, too, but the importance of

this work is evident from the fact that the costs of coal, of transporting and handling it, and of disposing of ash account for a little more than two-thirds of the total generation expenses which, in turn, absorb more than one-half of the revenue.

PLANT PROVISION

Sir Henry Self in his Convention paper on "The Economics of Electricity Supply" referred to the "plant shortage" and the B.E.A.'s collaboration with manufacturers to secure the utilization and expansion of their available capacity in the best possible way. He said that there was now a reasonable prospect of steady progress towards the target levels by 1955-56, "provided capital cuts do not intervene." In his presidential address Sir Vincent de Ferranti showed how the leading plant makers had almost doubled their capacity but said that "serious gaps" were developing in the forward programmes of some of them. He seemed to suggest that that was due to delay in the erection of power stations, a matter which Sir Henry did not touch upon in his paper but one which the B.E.A. has now taken into its own hands. Sir Vincent referred to out-of-balance conditions; these seem to prevail in some places but it is hard from these statements to assess the position as a whole.

AVOIDING A CLASH

In fixing the period of next year's Convention the Council should take care to keep clear of the first half of June. It is for this fortnight (4th to 16th) that a Joint Engineering Conference sponsored by the three principal Institutions is being planned in connection with the Festival of Britain.

HOME ACCIDENTS

The third summary of accidents in the home attributed to electrical causes—the second covering a whole year—prepared by Mr. H. W. Swann for Home Office interdepartmental study classifies a total of 41 mishaps in 1949 against 68 in 1948. The decline is comforting, though the figures are bound to fluctuate from year to year. The reduction has been mainly in accidents classed as miscellaneous and those for which electric fires are blamed. In the latter class, in addition to direct fatalities, many deaths unfortunately resulted from clothing fires attributed to inadequately guarded electric radiators. Very young or elderly people were involved in most of them. Fatalities in bathrooms increased from six to eight.

VEHICLE TAX CONCESSION

The Chancellor of the Exchequer is fully aware of the effect upon general costs of his proposed 33⅓ per cent purchase tax on commercial goods vehicles. He could not be persuaded, in the Committee stage of the Finance Bill, to remove it entirely, but he made substantial concessions in agreeing to confine the tax to the chassis and to include pedestrian-controlled vehicles among the exempted classes. Electric vehicles will benefit considerably from both: batteries are not to be considered part of the chassis and, of course, pedestrian-controlled vehicles are generally electric.

TOO AMBITIOUS

The group of trades constituting the building industry would appear to be the last subject for nationalization. But that has not deterred the National Federation of Building Trades Operatives from suggesting this course. The scheme put forward would absorb about 670,000 operatives leaving 293,000 (employed by 114,000 firms) "un-nationalized." Electrical contracting concerns employing over 20 men or having an annual turnover of £10,000 or more would be drawn in. As a mere preliminary the transfer to public ownership of building materials manufacture is proposed, including the production of "electrical apparatus and equipment"—a pretty tall order. In fact, the plan is a little too wide in its scope to be regarded seriously, even in these days.

"ELECTRICAL WHO'S WHO"

Brief biographies of about 2,600 leading men and women in all branches of the industry appear in the "Electrical Who's Who." This is now obtainable from the *Electrical Review*, Dorset House, Stamford Street, London, S.E.1, or from booksellers, price 12s. 6d. (postage 7d.)

Harrogate Convention

Large Gathering at Second Annual Function

MANY of the 1,280 delegates to the second British Electrical Power Convention arrived in Harrogate during the week-end in good time for the registration ceremony on Monday. The weather was uncertain but not too unpleasant. Through a misunderstanding we stated last week that the private meetings of the British Electricity Authority representatives were not being held this year. In point of fact nearly the whole of Monday was devoted to this purpose (two days were allocated last year) when addresses were given by Lord Citrine, Sir John Hacking and Mr. E. R. Wilkinson. Although not strictly a part of the Convention proceedings, reference is made to these addresses on page 1214.

During the period of the meetings at which the Press was not present we were able to inspect the exhibition again (having already seen it in course of preparation on Sunday) and found, as usual, that order had rapidly been brought out of chaos and that all the exhibitors were practically ready for the official opening in the afternoon.

We also examined some of the displays arranged by traders in the town. In Parliament Street, which is one of the roads leading to the Central Hall where the Convention meetings are being held, we saw four of these displays. The most effective was that arranged by England, Robinson & Co., Ltd. In a window with ample frontage and considerable depth there were examples of cookers, refrigerators, washing machines, ironers and smaller appliances arranged most attractively. In Buckley's window there was a smaller, but still excellent, collection of miscellaneous apparatus. Arthur English, Ltd., also displayed a variety of equipment and the fourth electrical shop window was that of the local service centre of the North Eastern Electricity Board.

To return to the exhibition, details of which were given in last week's issue. This is probably the best exhibition so far arranged in connection with the Power Conventions and their predecessors —it is certainly the largest. It has been arranged in the Sun Pavilion, in the

Valley Gardens, and its colonnade approach. Including the outside exhibits of electric vehicles there is a total length of something like 800 feet. The colonnades have glass canopies and the front has been boarded up to form the backs of one line of stands; there is another, opposite, line backing on to the rear wall of the colonnades. As usual, the exhibitors (who number ninety) have made remarkably good use of the limited space available to each and have provided a useful conspectus of modern electrical equipment and accessories, predominantly domestic but also containing many technical items. A great deal of credit goes to the British Electrical Development Association and its exhibition organizer, Mr. Norman Phillips, for a most attractive display.

Exhibition Opening Ceremony

At the official opening Sir Vincent de Ferranti who was accompanied by the Mayor of Harrogate (Councillor Whiteley) was greeted by Lord Citrine, as president of E.D.A., Mr. H. H. Mullens, chairman of the Exhibition Committee, and Mr. E. R. Wilkinson, chairman, E.D.A. Council.

Introducing Sir Vincent de Ferranti, Lord Citrine said that Sir Vincent had had a lifetime of service and experience in the electrical industry and was head of a large and enterprising firm which not only made heavy equipment but lighter appliances as well.

Declaring the exhibition open, Sir Vincent de Ferranti said that it was appropriate that his first assignment as president of the Convention should be the opening of an exhibition of this kind. He thanked all concerned, with a full realization of the amount of work involved in arranging such a display. He was glad that the tradition of the I.M.E.A. was being carried on; for this thanks were due to Lord Citrine and the chairmen of the Area Boards. The exhibition would show buyers what could be obtained when the industry was again actively selling electricity—a day he hoped would soon come.

He especially thanked Mr. Mullens, the associations and firms which had supported the exhibition and the facilities provided by the Mayor and by Mr. Baxter, the Harrogate publicity manager. Finally he expressed appreciation of the E.D.A. for planning the display, mentioning Lord Citrine and Mr. V. W. Dale in this connection. Sir Vincent said that this was a token visit of delegates. He hoped that all of them would find time to inspect the exhibits during the week, mentioning the presence at the Convention of the purchasing officers of the Area Boards.

Mayoral Reception

Monday evening's reception by the Mayor and Mayoress of Harrogate at the Royal Hall was well patronized. The Mayor and Mayoress were accompanied by the president and Lady Ferranti. Dancing was started off by Sir Vincent de Ferranti and the Mayoress in excellent style.

Opening the proceedings on Tuesday morning the president mentioned the last Harrogate Convention which was held eleven years ago.

Welcoming the delegates, the Mayor described the Convention as a brilliant assembly of knowledge and experience. Although a mechanical engineer he had taken charge of a works power station and had made a small generator. His Worship complimented Mr. H. H. Mullens and Mr. W. K. Fleming on the Harrogate floodlighting.

In thanking the Mayor, Sir Vincent de Ferranti said that a telegram of greetings was being sent to H.M. the King. He then presented his presidential address, a summary of which appears on page 1215.

A number of the delegates availed themselves of an invitation of the local Rotary Club to take lunch at the Lounge Hall.

Generating Plant Costs

At the afternoon session Sir Henry Self presented his paper on "The Economics of Electricity Supply." He departed from the strict text to emphasize very forcibly some of his points. He dealt with the difficulties of mounting capital cost and charges, but gave public testimony to the readiness with which manufacturers were endeavouring to lower prices. Sir Henry said they should try to get the price of plant down to £40 per kW.

1, Mr. E. R. Wilkinson and Dame Caroline Haslett. 2, Lt.-Col. E. H. E. Woodward, Mr. H. F. Carpenter and Brig. W. G. S. Thompson. 3, Messrs. J. W. Thomas, W. C. Parker and others leaving the Royal Hall. 4, Messrs. I. V. Robinson and H. Nielson. 5, Sir John Hacking. 6, Mr. W. J. Jones and Mr. and Mrs. H. A. Deacon. 7, Col. B. H. Leeson, Mr. and Mrs. H. W. Bosworth and Mr. A. J. Coveney. 8, Messrs. Norman Elliott, S. F. Steward and Mr. M. A. Bulloch. 9, The President and Lady de Ferranti greet Sir Harold and Lady Hartley, and 10, Lord and Lady Citrine. 11, Messrs. J. Johnson Smith, T. W. Child, H. L. Maddick, J. M. Charnley, H. E. Forrest, A. E. Nicol and D. T. Leathwood. 12, Mr. and Mrs. W. K. Fleming. 13, President opening exhibition: The Mayor, Mr. H. H. Mullens, Sir Vincent de Ferranti, Mr. E. R. Wilkinson and Lord Citrine. 14, Sir Vincent signs the B.E.A.M.A. visitors' book; Mr. A. H. Gambling on left. 15, In the Mayor's box at the Royal Hall: the Mayor and Mayoress with the President and Lady de Ferranti.

Mr. A. M. F. Palmer opened the discussion, saying that Sir Henry Self sounded "tougher" than he read. Capital restriction was a national, not just an industry problem. Consultative councils were a clumsy form of machinery. Consultation between employees and employers was part of good management. A balance should be secured by reducing costs, not by raising prices.

Mr. J. Eccles showed a slide comparing rises in costs of coal generating plant, steel and cookers with the small increase in electricity prices. A second slide forecast generating costs up to 1973, indicating that the price per unit would have to rise by 12 per cent in the next ten years.

Mr. R. Birt referred to the need for securing high power factor loads. In addition, improved load factor should be secured by installing equipment in consumers' premises at a probable cost of £5 per kW.

Mr. R. H. Rawll said that the industry's problems should be simplified in human terms: how the public could obtain the connection of cookers and electricity at prices which they could reasonably afford. Progress was the responsibility of each individual.

Plant Production Capacity

Mr. B. H. Leeson said that electricity supply and manufacturing were partners. What was stopping them achieving common objectives? Manufacturers had already invested capital to meet the British Electricity Authority's needs, and were able to do so. By 1953 they would be "flat" unless the B.E.A. could assure them that their output would be taken. The alternative was greater exports. Long-term industry could not run successfully under such conditions.

Mr. E. C. Lennox urged greater cultivation of the domestic load which could be more remunerative than railway electrification.

The discussion was concluded by two or three other speakers, and will be more fully reported next week.

During the afternoon Lady de Ferranti arranged a tea party and mannequin parade at the Majestic Hotel.

On Tuesday evening there was a rather less crowded house for the president's reception, but this made the dancing which followed more comfortable.

Wednesday was "early closing day" so far as business was concerned. In the morning Mr. L. J. Davies presented, on behalf of the Electric Lamp Manufacturers' Association, the paper on "Advances in Lamps and Lighting" and this was discussed up to lunch time. Three coach tours had been arranged for the afternoon. One party went to York by way of Knaresborough, Goldsborough and Green Hammerton. After tea at the Royal Station Hotel the return journey was made through Long Marston, Wetherby and Spofforth.

Another set of coaches took delegates to Bolton Abbey, via Blubberhouses and Bolton Bridge returning by way of Addingham, Ilkley, Otley and Pool. The third trip was to Fountains Abbey, tea being taken at Ripon.

Thursday's Proceedings

A very full business programme was arranged for yesterday (Thursday). Three papers were read in abstract: "Operation of Power Stations," prepared by the British Electricity Authority and presented by Mr. J. D. Peattie; "Boiler Plant—Present and Future," prepared by the Water-Tube Boilermakers' Association and presented by Mr. W. F. Simonson; and "Large Modern Steam Turbo-Generating Plant," prepared by the British Electrical and Allied Manufacturers' Association and presented by Mr. J. T. Moore. Abstracts of these and the other papers appear later in this issue. The whole of the afternoon was taken up by the discussion on these papers. Reports of the discussions will be published in next week's issue of the *Electrical Review*.

The usual luncheon arranged by the Electrical Association for Women was held yesterday at the Lounge Hall, Parliament Street, and in the evening the annual dinner took place at the Majestic Hotel. The principal guest was Sir Harold Hartley, president of the World Power Conference, and chairman of the Electricity Supply Research Council. The 400 guests later joined other delegates at the Royal Hall where in the course of the evening there was dancing and a cabaret was presented by Brian Reece.

To-day (Friday) the Conference concludes with a general meeting of delegates

1, The President delivering his address. 2, Tuesday morning's platform. 3, Sir Henry Self presents his Paper. 4, Sir John Hacking. 5, Listening to Sir Vincent de Ferranti's address. 6, Mr. A. M. F. Palmer opening the discussion on Sir Henry Self's Paper. 7, Sir Norman Duke and Mr. R. A. S. Thwaites. 8 and 9, Two views of the exhibition. 10, Messrs. E. A. Mills and H. J. Randall. 11, Mrs. R. A. Bebb, Mr. A. V. Burnett and Mr. R. A. Bebb. 12, Messrs. E. G. Batt and W. J. Girvan. 13, Messrs. Raymond Berry and R. Francies. 14, Mrs. Allen Hirst, Miss Vera Norvick and Mr. Allen Hirst. 15, The Convention staff issuing badges. 16, At the E.A.W. stand: Mrs. E. Lomas, Miss B. Card, Mrs. Bottomley, Mrs. F. H. Topham and Mrs. Bentley. 17, Members of Harrogate Rotary Club entertain Convention Rotarians.

The President and Lady de Ferranti receiving the guests on Tuesday evening: 1, Mr. and Mrs. J. P. Tucker. 2, Mr. and Mrs. E. T. Norris. 3, Mr. and Mrs. J. M. Hollander. 4, Mr. and Mrs. Dixon. 5, Mr. and Mrs. W. Hutton. 6, Mr. and Mrs. E. B. Sawyer. The last photograph (7) was taken at Lady de Ferranti's tea party and mannequin parade on Tuesday.

at which it is expected that it will be announced that Sir Henry Self, deputy-chairman (administration) of the British Electricity Authority, is to be the next Convention president. It is believed that the Convention will move south next year.

B.E.A. Meeting

PRECEDING the opening of the Convention, on Monday private sessions of representatives of the British Electricity Authority and the Electricity Boards were held at the Royal Hall. Lord Citrine, Chairman of the B.E.A., opened the proceedings with an address in which he dealt with the progress made by the organization during the past year. Among the matters upon which he touched was the demand for some form of external audit to ensure efficiency, a matter which Lord Citrine said could be looked after by the authorities themselves. He expressed hope that after the second year's accounts were published future reports would appear within six months of the close of the period. He congratulated the staff upon the improvement in thermal efficiency and referred to plant deliveries and costs. Lord Citrine also made reference to the "super-grid," retail tariffs, capital cuts, rural electrification, labour relations and the Electricity Supply Research Council.

Mr. E. R. Wilkinson, commercial manager, B.E.A., dealt vigorously with the subject of competition between gas and electricity and urged that the electrical industry must meet the expected intensification of that competition, adopting an aggressive rôle. Sir John Hacking, deputy chairman (operation), B.E.A., gave an address on the generating plant situation, and the steps which were being taken to meet the demand and encourage load-factor improvement.

Enfield Cables Exhibition

THE Ballroom of the Hotel Majestic is the headquarters of Enfield Cables, Ltd., during the Convention. The theme of this private exhibition concerns the harnessing of remote, and sometimes neglected, sources of energy, and the transmission of large blocks of power by a.c. or d.c. A large model of a 100 kW "Andreau" wind-driven generating plant is on view. "Compression" type cables for up to 275 kV are shown, and special attention is drawn to the 132 kV pipe-line compression cable, of which over five miles have recently been ordered for installation at Braehead power station, Glasgow.

Presidential Address

By Sir VINCENT DE FERRANTI, M.C., M.I.E.E.

IN his opening remarks the President said that last year Lord Citrine outlined the origin and purpose of the Convention and it was largely due to him that the Convention had such a wide scope and included all the interested parties on an equal basis, thus emphasizing the essential oneness of the whole electrical industry.

As chairman of the British Electricity Authority, Lord Citrine was able to make a progress report on the great industry for which he was responsible. He (the speaker), although an electrical manufacturer, had no authority to speak on anybody's behalf but his own.

Sir Vincent de Ferranti, chairman and managing director of Ferranti, Ltd.

Referring to the part played by the industry in the ever-wider application of inventions and discoveries for the benefit of man, Sir Vincent mentioned the scope revealed by the demonstration in the 1880's that high-voltage a.c. was the most flexible and advantageous system of supplying electricity. The arrival of the electric motor necessitated the improvement of the efficiency of the prime movers and the invention of the steam turbine by Sir Charles Parsons opened the door to immense advances. There had been continuous advance as the skill of designers and the materials made available had resulted in the use of higher steam temperatures and pressures.

A double process was in operation: the conversion to electricity of processes for which coal was now being used and, secondly, the conversion of the same total amount of fuel into light, heat and power in a more efficient manner. The electrical system could make use of advances both in generation and application as they became available. The amount of smoke emission was an indication of the scope for electrification, of the railways, in domestic applications and district heating.

Although the Chancellor of the Exchequer had referred to the serious bottleneck in power generation, his Department had taken action likely to prolong the difficulties indefinitely. He should take notice of Mr. Philip Reed (co-chairman of the Anglo-American Council on Productivity), who had said that it was meaningless to talk about increasing the United Kingdom's productivity without providing more horse-power per worker.

No less than the B.E.A., the manufacturers had to plan forward and they must know the requirements well in advance. It was inevitable that when a rapid change was required in the output of an industry out-of-balance conditions would continually arise. It happened during the war and it now arose in a modified form in the expansion of the electrical industry.

The balance sheets of four large electrical manufacturers showed that in the last four years their fixed assets had increased by 94 per cent. If orders were placed with people who had increased their facilities there should be no prolonged difficulties about the supply of plant. Indeed, a great amount of plant was awaiting the erection of power stations and very serious gaps were developing in the forward programmes of some of the manufacturers.

As regarded boilers, the largest maker had increased his fixed assets by 188 per cent in four years. The boiler makers claimed that in 1954 they would be able to put at the disposal of the B.E.A. a total evaporative capacity of 20 million lb/hr.

On the other hand, in the production of consuming devices there was considerable under-employment and waste of production facilities. This must also have its effect on the contractor and wholesaler. The stimulation of the sale of cookers and other domestic appliances would assist manufacturers in their export drive and help to implement the Government's policy of full employment.

While the B.E.A. and Area Boards were the manufacturers' most important customers they were not the only ones. The electrical industry exported £140 million worth of goods in 1949. When standardization questions arose the export market must not be forgotten.

Each section of the industry, particularly the manufacturers, strove to make a contribution to the advancement of the whole. The loose structure and varied pattern of private enterprise was particularly suitable for this creative endeavour. One large firm claimed to spend 2 per cent of its turnover on research—a small sum compared with what was being spent by the electrical industry on behalf of Government Departments. Yet, said Sir Vincent, that modest expenditure had put the knowledge of what could be done so very much ahead of what had been done that it was quite sufficient.

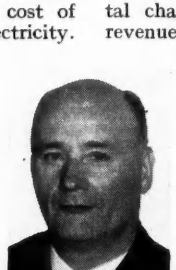
The leaders of the supply industry were to be congratulated on the way in which they had tackled their task. If their advance proved to be as rapid as that of their predecessors, somewhere between 1970 and 1980 the all-electric idea would have been transformed into the all-electric age.

Economics of Electricity Supply

Summary of Paper by SIR HENRY SELF, K.C.B., K.C.M.G., K.B.E.

IT is impossible in the space available to give an adequate précis of this admirable survey of the innumerable factors which govern the cost of generating and supplying electricity. The following is a mere outline.

The author's first section is historical leading up to an appreciation of the position of the electricity supply industry when the British Electricity Authority took over on 1st April, 1947, which is described as a change of organization rather than character. The assets taken over had a book value of nearly £1,000 million and capital liabilities of about £540 million were assumed.



Sir Henry Self is deputy chairman (administration), B.E.A.

Stressing the importance of the human element, Sir Henry Self says that in the last analysis achievement will depend on the personal contribution made by the employees. The new authorities have an obligation to continue the industry's expansion, involving a probable annual capital outlay of £100 million, an obligation which would be easier to fulfil if restrictions were not imposed by national investment policy.

Electricity supply has a higher ratio of capital in relation to revenues than most other industries, resulting in heavy capital charges (23 per cent of combined revenues). Depreciation of fixed assets absorbed 15½ per cent of the revenues of the B.E.A. and Area Boards in 1948-49. This emphasizes the need for obtaining best value for money, but much non-productive expenditure is forced on the industry by the requirements of outside interests and agencies such as flue-gas washing, the preservation of amenities, etc. The limited number of available sites for new power stations also leads to a disproportionate expenditure on civil engineering works.

Fuel costs in 1948-49 represented 65 per cent of total generating costs; they were 54 per cent in 1938. Freight costs continued to rise. The B.E.A. has a fleet of 33 colliers (which will rise to 47) but this has involved the Authority in consequential capital costs for improved berthing facilities, etc.

Sir Henry shows that the present in-

dications of the trend of generating costs are not discouraging. A downward tendency was experienced in 1948-49 as a result of improvement in generating efficiency and the interim adjustments of coal prices in July, 1948. This tendency was continued in 1949-50 to an extent sufficient to offset modest increases in other operation costs and repairs, and maintenance. On the whole it seems possible that average works costs may be held below the maximum figure to which they rose in 1948-49. On the other hand, a lower return from distribution expenditure must be expected as extensions are made to rural areas.

Making a number of assumptions in the light of existing conditions and the present trend, he estimates that in 1955-56 with an installed capacity of 19,500 MW and 58,500 million kWh sold the total expenditure per kWh will be 1.128d (including works costs of 0.480d) and the combined revenues from electricity and steam are expected to balance this. Sir Henry suggests that there is no ground for complacency about the future economy of the industry.

Bulk and Retail Tariffs

The basis and application of bulk supply tariffs are dealt with and the author says that forward estimates of the trend of these tariffs are in preparation with a view to giving guidance to the Area Boards in fixing their retail tariffs. This leads to a consideration of the form of retail tariffs and steps which are being taken as a preliminary to their rationalization.

Mention is made of the problems of covering the costs of rural supplies and of filling in the load-curve "valleys." Sir Henry examines the future financial prospects which he shows to be governed by the possibilities of improved load factor and efficiency, economies in "other costs" and by a number of influences beyond the Authority's control.

Methods of overcoming the plant shortage are next considered. Discussion and collaboration with manufacturers are said to have given a reasonable prospect of the elimination of load shedding by 1955-56 if capital cuts are not imposed. With expansion of generating plant improved transmission is being considered, particularly the provision of a "super grid" operating at 275 kV or perhaps even higher voltages.

Prices have been discussed with manufacturers and it is hoped that both the Authority and manufacturers will be enabled by satisfactory agreements to achieve the fullest economy in production to reduce present "almost prohibitive" costs to a more acceptable level.

Criteria of efficiency of the service are considered and it is recognized that the public judges success by the quality of the service rendered, as well as by financial results. Much is expected from the stimulation of rivalry between the various units of the organization.

More power is needed by industry if productive capacity is to be raised and the need can be met only by the continued expansion of the use of electric power. The amount of capital investment allocated to electricity supply is inadequate and this raises the prospect of serious effects upon industry. Among other matters touched upon in this connection are the exports of generating equipment and the barriers to the erection of power stations on the most suitable sites. Freedom of choice of fuel and power, with the resultant competition, is a stimulant to efficiency, but competition must be based on true economic costs. Granted these conditions the industry has nothing to fear.

"Saturation" a Remote Prospect

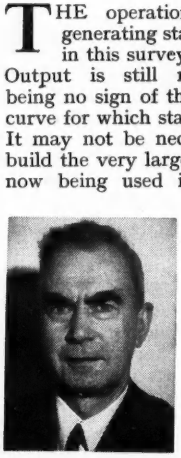
The final section of the paper glances at the future. Among the questions raised are the adequacy of future coal supplies, the cost and quality of coal, the problem of ash disposal and the possible future demand. As regards the last item Sir Henry believes that with competitive tariffs the industry has a long way to go before saturation can even be predicted. Electricity can make a substantial contribution towards the solution of the railway transport problem as the experience of the Southern Region of British Railways has proved.

In a brief passage on technical advances the author refers to district heating, gas turbines and water and wind power. He does not think that the use of atomic energy in the generation of electricity will materialize for many years to come, but he recognizes the need to adapt methods to the new discoveries of science.

Operation of Power Stations

Abstract of Paper Read by Mr. J. D. PEATTIE, B.Sc.(Lond.), A.C.G.I., M.I.E.E.

THE operation of B.E.A. steam-generating stations is commented on in this survey of technical progress. Output is still rising steadily, there being no sign of the "turn over" of the curve for which statisticians look eagerly. It may not be necessary "just yet" to build the very large turbo-generating sets now being used in the United States. The physical limitation of getting the output away from the site cannot continue to be overcome by further increase of the station voltage.



Mr. Peattie is deputy chief engineer (generation), B.E.A.

Changes in steam cycle and rising efficiency are next mentioned. The decrease of coal consumed in terms of lb/kWh has kept the rate of increase of total fuel requirements below the rate of growth of electrical output.

One of the operational features that is of major concern just now is the service availability of plant. Graphical and tabular illustration of the percentage relation between plant capacity and load shows the improvement that has taken place since 1947 when the loss of capacity was the maximum. Better maintenance arrangements and improved allocation of the fuel available have decreased the total loss of capacity and substantially improved the utilization of the total capacity of the stations. The moving total loss of capacity due to breakdown also fortunately shows signs of falling from its 1948 high value.

Turning to the financial background, Mr. Peattie states that about 56 per cent (or £111 million in 1949) of the total revenue of the industry is absorbed in generation expenses. The pithead cost of coal was £57.7 million, or half the generation expense. Interest and depreciation merit close scrutiny, too, particularly in view of the rising cost of borrowed money and of the capital cost of plant. A recent analysis (illustrated diagrammatically) of the estimated costs of large blocks of new plant now under construction shows that the cost of boilers is much the largest single item. Buildings and civil works together cost as much as the turbo-generators. Boilers are responsible for 48.1 per cent of the cost of repairs and maintenance.

From every point of view, political, financial, technical, the supply of fuel is the most important single factor in the design and operation of B.E.A. stations. Attention is drawn to the growth of requirements and to the increasing use of pulverized coal (6.8 million tons in 1949), which will increase greatly in future.

It is by no means proved that it is in the national interest to mine, raise to the surface and transport to power stations such large quantities of ash (3.66 million tons in 1948) when additional capital and running costs have to be incurred in handling it for disposal. There is need for closer investigation of the relative costs of providing better fuel and of furnishing equipment to minimize the ash content of coal at all stages from the mine face to the disposal ground. This problem is growing in difficulty.

Coal deliveries with a dry ash content exceeding 22.5 per cent amounted to 123,000 tons in 1939, whereas in 1949 the figure had risen to 2.25 million tons. Lest anyone be tempted to minimize the effect of a drop in calorific value from 11,520 to 10,910 B.Th.U./lb it should be remembered that, on an annual fuel bill of £75 million, that drop is equivalent to an extra payment of nearly £4 million.

Tables and diagrams indicate how calorific value has fallen steadily during the last ten years, the quantities of coal, the distances it is transported to the power stations by different means, its geographical origins and its treatment. Railway methods that were appropriate

for a multitude of relatively small deliveries are not now suitable for large power stations needing up to 3,000 tons daily. The urge by the Ministry of Fuel and Power to stock up in summer for use during the winter months means handling the coal twice, consequently increasing the cost.

The seventh table in the paper shows that within the next five years there will be a profound change in the characteristics of the boilers in B.E.A. stations. The eighth table summarizes the positions of breakdown in boilers last year; most of them were repaired within one week. The ninth table compares the number and sizes of steam-generating sets in use last year with those that will have been installed five years hence. The pattern which seems to be emerging is: 100 MW sets for base load operation, 60 MW sets for day loads, and 30 MW sets for short-period peak loads.

The last table classifies the types of turbo-alternator breakdowns that occurred last year. The time required for their repair ranged from a day to ten weeks average for blading (46 cases) and generator rotors (28 cases). The scale of blading breakdown has been greatly reduced, but is exaggerated in certain cases by the need to allow the frequency at times to fall to 48 c/s before shedding load. Electrical stability has not been such a problem as was feared at one time. It has not been necessary to run generators as synchronous condensers for power factor correction.

In the next few years a large amount of new plant will be commissioned which will differ considerably in steaming conditions from existing stations.

Boiler Plant

Paper Presented by W. F. SIMONSON

A NUMBER of water-tube steam boiler installations, representative of the current constructional programme of the B.E.A., are described with the aid of many drawings in this paper presented on behalf of the Water Tube Boilermakers' Association.

The object is to indicate features of design which are intended to maintain efficiency under heavy load in continuous service, which is a prominent aim to-day, since further advance in the thermal efficiency of boilers cannot be foreseen.

Capacities and operating pressures are analysed to show that the 1949-52 programme lists 288 boilers (under construction or planned) of an aggregate steaming capacity of $82{,}671 \times 10^3$ lb/hr, an average m.c.r. of 287.05×10^3 lb/hr/boiler. Relatively few of up to 150,000 lb/hr capacity are listed. The inclusion of twelve with individual ratings in excess of 500,000 lb/hr (representing nearly 8 per cent of the total programme capacity) marks a phase of development, namely, the emergence of the 60 MW "unit" boiler-turbine combination. The 351,000—400,000 lb/hr range is the largest class, comprising 27.1 per cent of the aggregate steaming capacity and 21.2 per cent of the total number of boilers.

A striking feature of the programme revealed by this tabulation is that 89.4 per cent of the total capacity is furnished by boilers designed for operating pressures corresponding closely to the standardized ranges, 42.6 per cent being in the 600 lb/sq in and 850 deg F category and 46.8 per cent in the 900 lb/sq in and 900 deg F category.

Mr. Simonson is technical officer to the Water Tube Boilermakers' Association

Twelve boilers are within the 1,275 to 1,420 lb/sq in range and four (each of 515,000 lb/hr) for 1,500 lb/sq in and 1,050 deg F will operate as 60 MW "unit" sets.

The increasing size of boilers has limited the use of travelling grate stokers to 19.3 per cent of the aggregate, comprising 83 boilers of between 150,000 and 260,000 lb/hr while 24 boilers representing 6.1

per cent of the capacity will have spreader stokers. Not less than 72.3 per cent of the plant capacity will be fired with pulverized coal, 176 individual units aggregating 339,600 lb/hr unit rating. The balance of just over 2 per cent includes certain oil-fired boilers and, notably, one with a cyclone furnace for 540,000 lb/hr at 950 lb/sq in and 940 deg F.

1953-54 Programme

The 1953-54 commissioning programme will add $8,325 \times 10^3$ lb/hr capacity; nearly half of this will be furnished by nine boilers, seven of which will be of 550,000 lb/hr. All will be fired with pulverized coal, excepting four (each of 240,000 lb/hr) to have spreader stokers for completing a station to contain 16 similar units. The fifth 60 MW "unit" boiler is included, of 515,000 lb/hr at 1,500 lb/sq in and 1,050 deg F; also one of 540,000 lb/hr at 1,400 lb/sq in and 965 deg F. All the remainder, apart from three designed for the 600/850 category, will be of the 900/900 class.

Thus the trend of development already noted is still more marked with time; the concluding two years of the programme do not provide for a single unit below 240,000 lb/hr while 294,500 lb/hr is the overall average boiler unit capacity.

The design of superheaters and methods of control are referred to in some detail. A recent development has been the adoption of steam-cooled supports, reminiscent of the original Loeffler design. The inlet tubes constitute the supports for the remaining loops, being led vertically downward to a lower draining header from which the superheater proper is fed. Brackets fitted to the vertical downcomers support the loops so that natural conduction maintains the "supports" at about the same temperature as that of the superheater tube.

The most widely employed means of control is the surface (spray) attemperator situated between a primary and a secondary bank of tube surface. In some cases the high temperature section is arranged for steam flow in parallel with the gas flow to assist in limiting tube metal temperature.

Pulverized coal burners at the furnace corners, firing tangentially to create flame turbulence, can be tilted thermostatically in accordance with the final steam temperature. While primarily intended to control slagging at the top and bottom of the furnace by raising and lowering the flame zone, this method can also (by regulating the gas outlet temperature) control superheat to a considerable degree.

Growth of boiler capacity has favoured bare tube construction. A widely pitched and staggered tube screen, the extent of which is determined by the permissible reduction of gas temperature, is the only provision before the superheater; the convection transfer surface has virtually disappeared.

The original long-flame arch-mounted p.f. burner is tending to be superseded, but has been adapted in twin furnace designs to control the discharge of dry ash by firing downward from the furnace roof; the flame turns upward over the convection transfer surfaces and the provision of ample radiant surface in the walls enables ash to reach the outlet at a temperature below its softening limit.

Slag-tap Type

Considering the number of installations in the United States, and to a lesser extent on the Continent, employing molten ash discharge furnaces, intermittent or continuous, the author expresses surprise that the first example of this type in Britain is only now about to be commissioned. This slag-tap boiler is of 525,000 lb/hr (m.c.r.) at 1,275 lb/sq in and 975 deg F.

The cyclone furnace (the first for use in this country is in course of manufacture) aims at reducing the whole of the ash to the fluid state, enabling it to be tapped and quenched for disposal in the solid condition, thereby eliminating fly-ash and carbon losses and simplifying, if not entirely obviating, the difficulties of maintaining boiler surfaces deposit-free.

The boiler designed for this furnace will be of 540,000 lb/hr (m.c.r.) at 950 lb/sq in and 940 deg F. It will burn crushed coal (just under 0.2 in) admitted tangentially with primary air and swirled intensely by secondary tangential air. The water-cooled cyclone maintains combustion by the whirling air stream against a molten film of ash. The hot gas rises through the throat of the combustion chamber into the boiler and the slag passes through a hole in the furnace floor.

Modern Turbo-Generators

Paper by Mr. J. T. MOORE, B.Sc., M.I.E.E., etc.

LARGE steam turbo-alternators are reviewed broadly with the aid of many sectional drawings in this paper presented on behalf of the B.E.A.M.A.

Particulars are given of steam pressures and temperatures, final feed water temperatures, degrees of condenser vacuum, generating voltages, etc., in several ranges of size. In B.E.A. stations there is some 13,600 MW of plant, of which total 2,966 MW is in units below 15 MW, which will be replaced as soon as possible, but many of these smaller sets will continue to be needed by users overseas.

The 15 to 25 MW range accounts for 2,700 MW of the total, the latest being single-cylinder machines except when coal cost and loading conditions justify the heavier expenditure on the rather more efficient multi-cylinder construction. The 25 MW rating is used more overseas than at home.

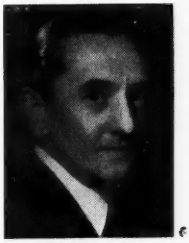
Similarly sets within the 30 to 45 MW range (accounting for 4,600 MW of the B.E.A. total) form the greater portion, measured in capacity, of all machines dispatched overseas in recent years.

The author points to the "swing" away from the four-pole 1,500 r.p.m. design to the two-pole 3,000 r.p.m. type for 50 c/s service, with some 3,600 r.p.m. sets for overseas 60 c/s systems. The higher speed type has tremendous advantages in large interconnected systems for starting and stopping on two-shift work, so 30 to 45 MW sets have become the "maids of all work" at home and overseas.

Turbo-generators for the lower steam pressures, representing 2,000 MW of the B.E.A. total, are unlikely to be much used in future. For those of medium pressures, representing 2,200 MW of the B.E.A. total, two-cylinder turbines have been most popular, but a number of three-cylinder sets have been installed. The G.E.C. was the first in this country to use blades having, at all stages, an increasing degree of reaction from root to tip with an impulse section at the root.

The high-pressure group is termed "special," generating at up to 33 kV (the majority at 11 kV) for direct connection to step-up transformers.

The majority in the 50 to 60 MW range have been 1,500 r.p.m. sets. Only comparatively recently have the increased steaming conditions enabled the larger outputs to be obtained at 3,000 r.p.m., with the required efficiency, from single-shaft machines. Some 500 MW in the 75 to 100 MW range is still in service in B.E.A. stations. Although two 75 MW sets are being built for Barking "C" and a third 100 MW set for Battersea, the trend is away from the large 1,500 r.p.m. machine.



Mr. Moore is chief engineer of the English Electric Co., Ltd.

Turning to standardization, the author states that the revision of B.S.132 (Steam Turbines) should be completed this year; B.S.752 (Turbine Acceptance Tests) is to be re-examined, while B.S.225 (Alternator Performance) is at present under revision.

The Economic Commission for Europe of the United Nations Organization initiated a fresh investigation through its Power Divisions to assist economic rehabilitation. The participating countries were Britain, Belgium, France, Italy, the Netherlands, Sweden and Switzerland. With International Electrotechnical Commission agreement, the British proposals were accepted (January, 1950) as international standards for 100 to 10 MW, 50 c/s, 3,000 r.p.m. machines. Alternative steam conditions were included to satisfy ruling requirements in other countries.

The British delegation also submitted a fully detailed specification for "preferred" standards machines up to 125 MVA for future consideration (not yet

accepted) which embodies to a large extent the characteristics put forward by the B.E.A. for 30, 60 and 100 MW sets.

These standards are tabulated in Mr. Moore's paper, which then proceeds to point out features of design. The trend of turbine blade construction is towards the "twisted" form with varying degree of reaction from root to tip, although some manufacturers prefer to confine blade twist to the lower-pressure stages.

Blade fixings vary widely in detail form. The paper illustrates how blading is shrouded and laced to mitigate the effects of vibration. Increased steam pressure, blade efficiency and vacua have made blade wear due to water cutting more acute; it is countered by fitting shields at the exhaust end to the inlet edges of the blades. Interstage drainage is provided to minimize the effects of moisture entrained in the steam. Water washing, usually at reduced speed, is now common to remove chemical deposits from the blades of large turbines. All makers are conducting intensive research into blade and nozzle forms.

Typical jointing arrangements for high-pressure turbine casings are illustrated and reference is made to governing and trip gear, alternator windings and excitation.

Hydrogen cooling is at the present time being applied to a number of 50 MW alternators and to the majority of 60 MW machines, all at 3,000 r.p.m. Future standard 60 MW and larger machines will be cooled in this way. The advantages are greatly reduced windage losses and noise, the "heat-carrying" capacity is about fourteen times that of air, heat is more rapidly absorbed from the machine and discarded more quickly to the coolers, thermal drops between adjacent parts are lower, there is no corona deterioration of insulation, exclusion of moisture and dirt reduces maintenance, and there is reduced risk of fire. Raising the hydrogen gas pressure from 0.5 up to 15 lb/sq in enables the rated machine output to be obtained with progressively less temperature rise in its windings, the differences being of the order of 25 per cent in the stator and about 15 per cent in the rotor. The paper illustrates hydrogen oil-sealing arrangements.

Reference is made to condenser tube layout, fixing and support. A typical five-stage feed heating system is illustrated. The increasing employment of multi-effect central evaporators in place of bled-steam unit types is also mentioned by the author.

Lamps and Lighting

Paper Presented by Mr. L. J. DAVIES, M.A., B.Sc., A.M.I.E.E.

ADVANCES in lamp design and the art of lighting are dealt with in this paper presented on behalf of the E.L.M.A.

More than ten thousand people are now employed in lamp making in this country. The annual world output of statistically controlled mass-produced varieties is 2,000 million. A manufacturer is nowadays called upon to make more than 6,000 different type sizes of lamps, but advances in design are not easily separated into historical periods.

The form of filament has not changed since the introduction of the coiled-coil type, but progress has been made in the suspension and mounting of filaments in projector lamps. The possibilities of further improving efficiency are small. An astonishing variety of glasses has come out of the lamp industry's work. Many make possible advances in discharge lamp design and some are of great interest in non-lamp respects. Recent experiments suggest that a change may be impending in lamp stem glass. Lamp glass compositions are tabulated in the paper.

The majority of bulbs are made by the "Ohio" machine, which has practically replaced the "Westlake" machine, and by the ribbon machine capable of producing 1,000 bulbs a minute. The iron-nickel wire covered with copper ("Dumet") was a remarkable invention that relieved many lead-in sealing

problems. Nevertheless, nickel-chrome-iron alloys have been made to match lead glass accurately with lower stresses for vacuum-tight seals.

Changes down to 0.000002in in the roundness of filament wire which may itself be only of 0.0005in diameter can be checked by a method recently developed whereby the variation in setting of a mechanical gauging contact displaces the adjustment of an electrical bridge circuit.

The mechanical capping of lamps is shown diagrammatically in the paper and explanations are given of the ways in which developments in the shape and surface of bulbs can be made to control the polar distribution of light from the filament.

Mr. Davies is director of research and education, British Thomson-Houston Co. Ltd.

Turning to discharge lamps, Mr. Davies has no changes to report in sodium lamps, whereas the peculiar versatility of the mercury discharge type has brought about a large family of types designed for different functions, which the author classifies into four groups. First, in this country, six sizes of fluorescent lamps for mains voltage are available in a variety of colours. Tabulated details enable the author to explain some anomalies in respect of wattage and dimensions, efficiency and colour, and the confusion that may arise when trying to distinguish between colour appearance of the tube and colour rendering of its light.

Provided lamp-wall temperature and current density for reasonable efficiency are satisfied, the lamp shape can be varied between very wide limits. The gain in both efficiency and maintenance due to "phosphor" research is evident, but some efficiency has to be sacrificed to obtain pleasant colour rendering. Great Britain has been in advance of all other countries in the replacement of zinc beryllium silicates by the halophosphates. There has been a constant seeking for the best operating circuit, complex in variety, explained by six diagrams in the paper.

Secondly, there are medium brightness lamps, sodium for street lighting and mercury for street and general industrial lighting either alone or in combination with filament lamps. A main development has been in connection with glass for the arc tube to enable the standard vertical lamp to be operated horizontally at full efficiency with standard control gear without the addition of magnetic control. The second advance has been the introduction of a high wattage (2.5 kW) glass envelope mercury lamp for normal mains voltage particularly designed for high-bay engineering factory lighting.

Thirdly, there are high brightness lamps, including mercury, mercury-cadmium and xenon, obtained by "compacting" the arc source, which has been carried to the extent that an arc length of 10 mm will accommodate a 10 kW arc. Recent advances have been towards the development of suitable studio lamps for taking cinema films in colours and their projection in theatres. Their design has called for the special engineering of seals and prefocusing arrangements, as an alternative to the carbon arc lamp with feeding mechanism.

The very high cost of xenon gas and other factors may restrict the use of this lamp to particular purposes. It is likely, in the author's view, to be most useful in the air-cooled rather than the water-cooled form. Finally there are condenser discharge flash lamps for photography and stroboscopy.

Turning from lamps to lighting, Mr. Davies points out that it is the proper control of the pattern of brightness in the field of vision which permits good seeing. He mentions broad recommendations that have been drawn up to assist in producing a pattern of brightness which will help vision. They are not at all easy to accomplish in all cases, especially when economic factors have to be considered, but the recommendations are a helpful guide and desirable aim.

In this connection the method of representational photography, which enables the results to be assessed, is shown to be an important tool. The tasks of the street lighting engineer are especially difficult because of the size of the area to be illuminated as indicated in the concluding portion of the paper.

VIEWS on the NEWS

By REFLECTOR

FOR chapter titles in his Convention paper Sir Henry Self has drawn on Shakespeare (and others) but the context of some of them is not so apt. The first section is headed "All Our Yesterdays" which the gloomy Macbeth held had "lighted fools the way to dusty death." I hope that better lessons have been learned. Sir Henry goes back a line or two for his final heading: "To-morrow, and To-morrow, and To-morrow," which, of course, goes on: "Creeps in this petty pace from day to day." Something faster than this is called for I think. From the Sonnets, Sir Henry quotes "Why so Large Cost?" ("Why so large cost, having so short a lease, Dost thou upon thy fading mansion spend?")

★ ★ ★

Many people consider that there are too many associations in the electrical industry but the situation is not quite so bad as is suggested by a Manchester newspaper. Commenting on the "giant exhibition" at the Convention, this paper says: "Eighty-one associations, the British Electricity Authority and the North Eastern and Yorkshire Electricity Boards will be represented on the 90 stands.

★ ★ ★

As an accepted part of the landscape a grid transmission line which I frequently pass would normally be unnoticed. The other day, however, a change in the appearance of the towers attracted my attention. Half of each, from top to bottom, had been painted red—presumably a coat of "priming." Ordinarily these galvanized structures do not require painting but I am told that many are now reaching an age at which a protective coating of paint is needed, the "life" of the galvanizing being reckoned at about twenty years. The job of painting, after wire-brushing the metalwork, must be quite a tricky one I imagine.

Even when the electricity supply authorities want to put cables underground they come up against the inevitable "amenities." The Midlands Electricity Board is seeking permission to lay a h.v. cable in Stroud (Glos.) but the route passes near some lime trees. On the ground that the work would cause damage to these trees the Urban District Council has refused to give its sanction. It may be that this is a case in which overhead lines would be preferred.

★ ★ ★

Glancing through some French electrical journals I was surprised at the number of domestic appliances I came across which have no British-made counterparts. I believe I am right in saying that there are not being produced in the United Kingdom at the moment a small deep fat fryer for domestic use, an iron which automatically tilts backwards to lift the heated soleplate from the ironing board when not in use, and a combined vacuum cleaner and floor polisher which can also be used to give a current of warm air for drying the hair—or the baby! For office use, too, there is a small heating device which fits under the keyboard of the typewriter to warm the typist's fingers in cold weather. Unusual applications of apparatus that is well known in this country are also suggested, e.g., infra-red lamps for drying hair and also nail varnish.

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The state of the electrical appliance market, or at least one section of it, has not apparently yet reached the stage where it becomes necessary to adopt such sales inducements as are now fairly common in the United States. In one of the latest advertisements there retailers are offered, in addition to a discount of 40 per cent, "a gaily coloured, quick-folding, high-styled, durable yacht chair free with an order for twelve fan heaters." Some of these chairs would come in useful while we wait for the 100 per cent purchase tax to be reduced.

NEW BOOKS

An Introduction to Heat Transfer. By M. Fishenden and O. A. Saunders. Pp. 205; figs. 49; index. Oxford University Press, Amen House, E.C.4. Price 15s.

The theory of the transfer of heat constitutes the basis of the design of every type of heat engine and with the development of newer and more complicated prime movers it is becoming of ever-increasing importance. Heat transfer also lies at the root of the design of refrigerating machines and air-conditioning plant. In the general run of textbooks dealing with these branches of engineering, the science and practice of heat transfer receives but scant attention and we echo the authors' contention that there is need for a concise, up-to-date book which, while interpreting the results of experimental investigations in the light of established physical laws and theories, presents them in a manner convenient for practical use.

The three ways whereby heat is transferred from one body to another, viz., radiation, conduction and convection, are discussed at length and the formulæ for the amount of heat transferred under the various conditions met with in practice are developed. Some of the more practical aspects of the problem are then investigated, including the relation between heat transfer and friction and the difference between natural and forced convection, all of which have an important influence on the design of such apparatus as tubular heat exchangers. Finally, chapters are devoted to the laws governing heat transfer from condensing vapours as in steam condensers, and also boiling liquids as in steam generators.

The book contains a wealth of practical data in the form of graphs and numerical tables, and its value is considerably enhanced by numerical examples which are worked out to demonstrate the application of this data to practical problems. It is to be regretted that opportunity has not been taken to include with each chapter further examples, with answers only, so that the student reading for his engineering degree might work them out for himself. Apart from this, we feel that this book will prove of considerable value to all engineers and particularly research workers concerned with the development of the types of equipment noted above.—A. R.

Transformation Calculus and Electrical Transients. By S. Goldman. Pp. 439; figs. and index. Constable & Co., Ltd., 12, Orange Street. London, W.C.2. Price 30s.

Mathematics can be of very great value to the electrical engineer, but unfortunately most books on the subject do not cater specifically for his needs. Such is not the case, however, with the present work, which should be especially useful to research workers in electrical and radio engineering, and as a basis for further study by post-graduate electrical engineering students.

The book develops the well-known Laplace transform method and its inverse for the solution of transient problems in linear networks, a previous working knowledge of the calculus and an elementary knowledge of complex quantities and differential equations being assumed. The treatment is systematic, the first two chapters, being in the nature of an introduction, deal with determinants and the formation of network equations either by a loop or node analysis. The inversion theorem, impulse and step functions are well treated and chapters are devoted to the study of gamma and error functions and Bessel functions. The later chapters deal with the solution of partial differential equations, and solutions in series, while the appendices include a table of Laplace transforms and a discussion on Fourier integral analysis.

The Laplace Transform has been written as $F_{(s)} = \int_0^\infty f(t)\, e^{-st}\, dt$ and by using "s" for the complex variable instead of the more conventional "p" the author has avoided the confusion which can sometimes exist in a student's mind as to the relative significance of such terms as p, jw and D (where $D = \frac{d}{dt}$).

The emphasis throughout the book is

on the application of the theorems stated and the author has succeeded in giving physical significance to what are sometimes considered to be abtruse mathematical calculations. This is in no small measure due to the wealth of examples and figures which are a noteworthy feature of the book.—C. M. B.

The Electrical Handbook for Women. Fifth edition. By Dame Caroline Haslett. Pp. 481; illus. English Universities Press, Ltd., Saint Paul's House, Warwick Square, E.C.4. Price 10s 6d.

With the new tariff structure still under consideration and with the continuing necessity for restricting electrical development and economizing in the use of electricity in peak hours, it was felt premature in this fifth edition to embark on a fundamental revision. The changes in the structure of the electricity supply industry brought about by the Electricity Act, 1947, are, however, detailed in a completely re-written chapter on "Electricity Legislation," while additional material has been included on certain labour-saving appliances and fluorescent lighting developments. Elsewhere amendments have been introduced only from the point of view of accuracy.—W. R. C.

Eléments de Calcul Tensoriel. By A. Lichnerowicz. Pp. 216; bibliography and table of contents. Librairie Armand Colin, 103, Boulevard Saint-Michel, Paris. Price 180 Fr.

This book, which is written in French, ought to be examined by all those engineers and physicists who desire to obtain a basic knowledge of the tensor calculus in preparation for its application to the solution of those particular problems which call for its aid. Physicists have used tensor methods for a long time and engineers are slowly beginning to realize their value in the analysis of the more intricate studies with which they have to contend. Those making a first approach to the subject will find this book a useful guide to the purely mathematical fundamentals. It is in two parts, the first dealing with the tensor calculus and the second with certain applications in physics.

More particularly, Part 1 covers the idea of vectorial space in three and in n-dimensions, Euclidean and affine spaces, tensor algebra, Euclidean space in curvilinear co-ordinates, and Riemannian space. Part 2 is concerned with the tensor calculus and classical dynamics, the restricted theory of relativity and Maxwell's equations, and the elements of the relativity theory of gravitation.

Throughout the book the treatment is formal in character but, read in conjunction with one or another of the works on engineering applications of tensors, this should not prove discouraging to the electrical engineer seriously wishing to acquire a working knowledge of tensor fundamentals. The author is Professor in the Faculty of Sciences of the University of Paris and he deserves our thanks for this useful book.—S. A. S.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Quote the Reference

FURTHER to Mr. Griffin's letter in your issue of 19th May, regarding the non-quoting of references by manufacturers and wholesalers, there are other omissions in correspondence which put a brake on the progress of any business. There is the type of letter which never mentions the subject it is being written about. Almost as familiar are the advice note and invoice which give numbers and letters that bear not the slightest clue as to whether it is a triple-pole switch or a television set, except that with the television set you know you have got to pay purchase tax.

Some large factors are making a habit of putting down a series of items with catalogue numbers, but no indication of even the firm the catalogue number belongs to. No doubt the idea has been culled from the Services and in the mistaken impression that the series of catalogue numbers and letters bear as much significance, and are as well known as some of the Service units were known by initials.

May I make an appeal to those who are selling switches, or cable, to be proud of it and to say on their invoice what they are.

H. F. Truman,
Walsall. TRUMAN ELECTRICAL CO.

PARLIAMENTARY NEWS

By Our Special Reporter

DURING the Committee stage of the Finance Bill, the Government announced a concession on the proposed 33⅓ per cent purchase tax on certain classes of commercial vehicles. This is to be changed to a tax on the chassis payable from 1st July by the manufacturers.

In the debate which followed this announcement, Mr. Dodds, a Labour member, pleaded for relief from the tax for electrically propelled vehicles. He said that there were almost 15,000 of these in use, mainly for door-to-door deliveries of bread and milk. By their use remarkable progress had been made in saving labour and, at the same time, in getting rid of the irritating noises in the early hours of the morning.

Use of the 15,000 vehicles meant a saving last year of some 14,500,000 gallons of petrol, or roughly 2,500,000 dollars. That was a very important fact. They were told during the Budget debate that there was a need to ensure that more vehicles were sent abroad and that was one of the reasons for applying the purchase tax. There could be no fear of that sort in regard to electrically propelled vehicles, because attempts to sell them abroad had failed. Thus the same reason could not be advanced for taxing these vehicles. One of the most important factors in asking for sympathetic consideration was that an electrically propelled vehicle of the same size as a petrol vehicle cost anything from £200 to £400 more. In addition, a charger cost £100.

Mr. Jay, the Financial Secretary to the Treasury, said that the proposed chassis tax would lighten the total amount of the tax and so help in particular the heavier and more expensive vehicles, where its weight had naturally tended to be higher, including electric vehicles. The batteries of these vehicles would now be outside the range of the tax. It would be impossible to exempt all electrical vehicles and retain the tax on petrol vehicles, but the pedestrian-controlled vehicles, described as "prams," fell into a separate category. In some ways they were analogous to hand-drawn barrows, and would be exempted from the tax.

Electricity in Dominica

Mr. Peter Smithers asked the Secretary of State for the Colonies whether he was aware of the inadequacy of the electricity supply in Dominica; and what steps he was taking to improve it.

Mr. Griffiths said that the Colonial Development Corporation had undertaken to install and operate hydro-electric plant which it was hoped would be working early in 1952.

Meter Reading

Mr. Alfred Robens, Parliamentary Secretary to the Minister of Fuel and Power, replying to Mr. J. Hale, said that to have joint meter readings would not necessarily halve the man-power involved. Not all houses had both gas and electricity meters; it would take more time for a man to read two meters; and he would more quickly become weighed down by pennies.

Both the Gas and Electricity Boards were anxious that meter readers should become something more than men who called out "gas" or "electricity," stumped in, and stumped out again. They preferred that they should become really good public relations men helping householders with their fuel problems.

Tidal Power Scheme

Mr. J. Grimston asked the Minister of Fuel and Power what proposals he was making to have a tidal power scheme built within the British Isles, from which to obtain experience in the working of such schemes.

Mr. Noel-Baker said that the only scheme of this kind at present envisaged was that based on the Severn Barrage. Even if the necessary preliminary experiments were complete, it would be difficult, in the present conditions of restricted capital investment, to give it priority over housing and other more pressing needs. This would not, however, always be true, and arrangements were therefore in hand for the construction of a tidal model of the estuary of the Severn, which was an essential preliminary to the project.

Reserves and Compensation

Lt.-Cdr. Clark Hutchinson asked the Minister if he would now make a statement about the disposal of the reserve funds which belonged to former local authority electricity undertakings in South-East Scotland.

Mr. Noel-Baker said he understood that the representations which the South East Scotland Electricity Board had made to him, and the British Electricity Authority's comments, were now under consideration.

Sir William Darling asked the Minister of Fuel and Power when compensation due to Scottish local authorities in respect of the severance of their gas and electricity undertakings would be paid.

Mr. Noel-Baker said that regulations prescribing the principles on which severance compensation was to be distributed were in the course of preparation and would be published as soon as possible. He understood from the Gas Council and the B.E.A. that compensation would be paid shortly after the regulations were made.

North Wales Proposal

Mr. Marples asked when the Minister would be in a position to give the estimated capital cost of the proposed North Wales hydro-electric scheme.

Mr. Noel-Baker said that the B.E.A. expected to complete the surveys of all the schemes in North Wales in about a year from now. It should then be possible to give a useful estimate of the capital expenditure which the schemes, if executed, would require.

Telephase Protection

BECAUSE of its inherent simplicity and the absence of voltage transformers and direction relays, the telephone carrier-current system of protection has obvious technical and economic advantages and sets a high standard in carrier-current relaying. Developed jointly by A. Reyrolle & Co., Ltd., and the General Electric Co., Ltd., it is based on the Merz-Price pilot-wire systems in which discrimination between internal and external faults is obtained by comparing the currents at the two ends of the protected feeder both in magnitude and phase-angle. The major point of principle in which it differs from the Merz-Price systems is that in telephase protection only the phase-angles of the currents at the two ends of the feeder are compared, this itself being a sufficient criterion of whether the fault is internal or external.

A protective system of this type, manufactured by A. Reyrolle & Co., Ltd., is to be installed on the British grid between Coventry and Nottingham. This equipment has already been assembled, and at the company's Hebburn works last week it was demonstrated and put through a series of tests.

At each end of the line to be protected will be a 2 VA sequence network, a carrier rack, the Coventry local oscillator frequency being 260 kc/s and Nottingham oscillator frequency 156 kc/s, and the relevant relays, "output," "tripping" and "interference." It should be noted at this point that two types of sequence network are available, imposing burdens on the line current transformers of 2 VA and 8 VA respectively, the former being used on the British grid and being demonstrated in the tests. The 8 VA networks are used where particularly low fault settings are required, and operate in conjunction with the standard carrier equipment.

The typical system demonstrated and tested at Hebburn proved the stability of telephase protection and also gave a good indication of the various factors of safety, fault settings, and routine testing facilities.

Nuclear Physics Conference

IT is announced by the Ministry of Supply that the British Atomic Energy Research Establishment at Harwell is organizing an International Nuclear Physics Conference to be held at Harwell and Oxford from 7th to 13th September next, and most of the sessions will be in the lecture theatres at the Clarendon Laboratory there. The Conference will be divided into two parts, the first concerned primarily with the use of high energy particle accelerators for nuclear physics experiments; and the second with lower energy nuclear physics, including the use of atomic piles for experimental work. The number of delegates will be limited to about 200 by the capacity of the lecture theatres and attendance will be by invitation only. Delegates are expected from the U.S.A., British Commonwealth, Western Europe and British Universities working in this field.

The programme includes a visit to the Atomic Energy Research Establishment on Saturday, 9th September. Subjects to be discussed on 7th and 8th September will be high energy accelerators, experimental and theoretical high energy physics and beta-ray spectroscopy; on 11th and 12th September nuclear physics will be the subject and on the last day, 13th September, pile physics and neutron spectroscopy will be discussed.

Transport Goods Guide

The July edition of *Transport Goods Guide* (published twice yearly by Associated Iliffe Press) will be of special interest to all transport users and operators. Having a total of more than 100 pages, it provides exhaustive information on all forms of goods transport by road, rail, canal and sea (coastwise and to the islands), throughout England, Scotland and Wales. It is obtainable for 2s 6d (including postage) from Iliffe and Sons Ltd., Dorset House, Stamford Street, London, S.E.1.

High-voltage Cable Treatment

Drying and Impregnation Plant at Gravesend

TO augment the output of high-voltage cables from its Gravesend works, W. T. Henley's Telegraph Works Co., Ltd., has installed a new drying and impregnation plant. This has been designed, erected and tested by the staff of the company's factory and research laboratories, and owing to space limitations most of it has had to be accommodated below ground and divided into two parts, each having its own ancillary equipment. Existing plant and equipment had to be moved and re-sited with diversion of services to make way for the new plant. Most of this work had to be carried out at week-ends to avoid disorganizing normal factory working.

The method of operation is best described by considering a tankful of cable on its journey through the cable plant, starting with the paper-covered core and ending with the fully dried and impregnated core, ready for the lead press.

The paper-covered core first passes from the lapping machine into one of a number of shallow trays of annular plan, each of which is equipped with a drain plug for releasing compound when the core has been removed for lead covering. Four drying and impregnating vessels have been installed, each having an internal diameter of 11ft and an overall height of 13ft 11in. To reduce the volume of compound involved during a treatment, the centre space is occupied by a dome 5ft in diameter and 9ft high. Even then, each vessel holds about 20 tons when full. As the cable trays are inserted heavy current connections for conductor heating, and electrical resistance pyrometers for external cable temperature measurement, are brought into operation. The vessels are steam jacketed on the lid, the outside and the outer part of the bottom and the dome. With vessels of this size the junction between the main body and the lid often presents a leakage problem. In the present case the problem is solved by using oil seals, about a ton of oil being used for this purpose alone.

For drying, external heat is obtained by filling the vessel and lid jackets with steam, internal heat being obtained by passing heavy currents through the cable conductors. The associated electrical plant comprises two 350 h.p. 6.6 kV three-phase synchronous induction motors driving four 200 V 600 A d.c. generators. This occupies its own section of the main pit, but the switchboard, including its contactors operated by the field exciters, is at factory level.

The "rough" vacuum pumps for the whole plant are of the reciprocating type, the final pumps, one for each vessel, being of the rotary kind. They are interconnected so that any pump needing maintenance can be taken out of service without affecting the working of the plant.

When the cables have been thoroughly dried under heat and vacuum they are ready for impregnation with compound. When the compound reaches the factory it is first pumped into a "waiting tank," and after passing electrical and physical tests it is transferred to a 50-ton storage tank, from which it is drawn as required. It reaches the plant storage vessels by passing through a filter which can retain particles down to

General view of the impregnating vessels

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General view of the impregnating vessels

colloid size. This avoids the accumulation of foreign bodies which might, in time, impair the efficiency of the compound circulation.

The normal practice is to allow the cables to "soak" in compound under pressure during the main period of the impregnating process, a gravity-operated pump being used for this purpose. The quantity absorbed by the cables after bringing on the compound is relatively small, and the supply is obtained from the accumulator which maintains a gauge pressure of 40 lb/sq in. A motor-driven pump, which is started and stopped automatically by the position of the accumulator ram, keeps up the supply required.

After impregnation and before removal of the trays, the compound is cooled by applying cold water to the jackets of the vessel and pumping the compound through water-cooled heat-exchangers. Cable treatment then being completed, the trays are taken out of the vessel and the cables are paid off into the back of a lead press for sheathing.

When the plant is in full commission, cable treatments will be staggered, one pair of treatment vessels being at the drying stage while the other pair deal with impregnation and cooling. The control valves for the plant, about 100 in all, are individually numbered, and operation charts are provided. Oil-sealing is used throughout and there are facilities for compound sampling at all stages.

This plant has already produced many miles of high-voltage cable and the results indicate that a big advance has been made towards obtaining quantity production while maintaining the high quality of the finished product.

Accidents in the Home

Summary of Home Office Statistics

THE accompanying table summarizes the household fatalities that occurred during 1948 which were attributed to electrical causes. The statistics are compiled by Mr. H. W. Swann, Chief Electrical Inspector of Factories, for the use of a Home Office Interdepartmental Committee which concerns itself with this subject.

Type	Number	%
Bathrooms	8	19.51
Electric irons, kettles, etc. ...	9	21.95
Electrically operated tools ...	2	4.88
Faulty wiring	6	14.63
Electric fires (electrocutions) ...	5	12.20
Miscellaneous	11	26.83
	41	

In addition to the cases of electrocution recorded there were 35 cases in which death resulted from clothing fires. In all but one of these the fires were caused by inadequately guarded electric radiators. There is a degree of similarity between the accidents, many of which were to very young or elderly people. Full-length nightwear, dressing-gowns and housecoats seem to screen the legs so that the first intimation of trouble is the rapid spread of flame from the hem of the garment upwards. Party frocks were in some cases set on fire and the victims were of adult age.

It is impossible to estimate the ratio between the fatal cases and those in which a similar accident does not result in death. In the opinion of experienced fire officers, the ratio is certainly not less than 5:1, and there is a good deal of evidence in the burns wards of the hospitals during the cold period of the year which affords some confirmation of this estimate.

Plugs and Socket Outlets

WE have received from the British Standards Institution a copy of the recently published new edition of B.S.546, which deals with two-pole and earthing-pin plugs, socket outlets and socket-outlet adaptors for circuits up to 250 V. Although it is to a certain extent superseded by B.S. 1363:1947, dealing with fused plugs and shuttered socket outlets for general domestic purposes, this specification has been retained to provide for extensions to existing installations and for other purposes for which this type of plug and socket outlet is preferred.

The present revision incorporates modifications required in the light of modern manufacturing technique, but the essential dimensions affecting interchangeability are not altered. While the main object of the specification is to ensure interchangeability, safety design features are also included. Materials to be used are described and various constructional requirements are set out for standard ratings of 2, 5, 15 and 30A. Copies can be obtained from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1, price 3s postage free.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Uganda Electricity Board announces the appointment of **Mr. J. M. Stock,** M.Eng., M.I.Mech.E., M.I.E.E., as chief electrical engineer to the Board in succession to **Mr. A. O. Cosgrove,** B.Sc., M.I.E.E., who has become resident representative of the General Electric Co., Ltd., in East Africa. Mr. Stock is a graduate of the University of Liverpool and served his apprenticeship with the British Thomson-Houston Co., Ltd. After eighteen months with the Liverpool Electric Cable Co., Ltd., he went to Argentina where he served with the Buenos Aires & Pacific Railway Co., Ltd., and later with the Cia. Interprovincial de Servicios Publicos and the Cia. de Electricidad del Sud Argentino. Returning to the United Kingdom in 1934, he joined the staff of the Yorkshire Electric Power Co. as a district engineer. In 1938 he became chief electrical and mechanical engineer of the Public Works Department in Palestine and, in 1946, he transferred to Nigeria as senior electrical engineer and later deputy electrical engineer-in-chief of the Government electricity undertakings. In 1949 he retired from the Colonial Service and was appointed deputy chief electrical engineer to the Uganda Electricity Board.

Mr. A. W. Wallbank, B.Sc., A.R.I.C., has been elected president of the Electro-depositors' Technical Society for the 1950-51 session.

The General Electric Co., Ltd., announces the appointment of **Mr. W. J. Bird** as sales manager for the London area, which includes responsibility for the company's branches at Ipswich, Southampton and Plymouth and the sales depots at Brighton, Canterbury, Croydon, Luton and Reading. Mr. Bird transferred from the Midland Area in July last year to join the personal staff of Mr. T. W. Heather, sales director. Mr. Bird was educated at King Edward School, Birmingham, and in 1925 joined the G.E.C. Witton Engineering Works as a student apprentice. He is well-known as a rugby player and is a regular contributor to the B.B.C. "Sport in the Midlands" programme.

Mr. W. J. Bird

Mr. J. Taffs, publicity manager of the English Electric Co., Ltd., retires at the end of June, after forty-five years' service. He started work with Dick, Kerr & Co., in 1905, in the Estimating Department, and was transferred to the Publicity Department in 1911, becoming advertising manager in 1913. After service in the Royal Naval Air Service in the 1914-18 war, Mr. Taffs returned to what had then become (in 1919) the English Electric Co., being appointed advertising manager in 1922 in London, and going to Stafford in 1930 when the Department was moved. For a period he held the office of joint publicity manager with the late Mr. H. W. Kefford, becoming manager of the Publicity Department in 1933. He returned to the company's offices in London in 1945. On his retirement Mr. Taffs relinquishes the chairmanship of the B.E.A.M.A. Publicity Committee, of which he has been a member since its inception in 1924. After a month's holiday in Italy, Mr. Taffs will take up various consultative appointments in connection with engineering and other publicity matters. He and Mrs. Taffs will reside at Sheepcote Hotel, Harrow, Middx.

Mr. J. Taffs

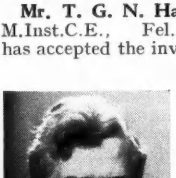
Mr. B. Hallows Garside, M.I.E.E., has resigned his position as managing director of the Britannic Electric Cable & Construction Co., Ltd.

Mr. C. C. Duncombe, who was previously an outside representative of Simms Motor Units, Ltd., Plymouth Branch, has been appointed branch manager as from 1st June, in place of **Mr. A. E. Ludgate,** who has resigned.

Mr. G. L. Wareham has been appointed publicity manager to the Skefko Ball Bearing Co., Ltd., Luton. Before joining SKF,

Mr. Wareham was chief assistant to Mr. W. G. Richards, publicity manager, Marconi's Wireless Telegraph Co., Ltd., Chelmsford.

Mr. T. G. N. Haldane, M.A., M.I.E.E., M.Inst.C.E., Fel.A.I.E.E., M.Cons.E., has accepted the invitation of the Executive



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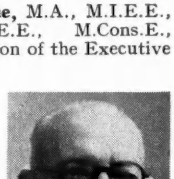


Mr. F. W. Smith

Council to become president of the Association of Supervising Electrical Engineers in succession to **Mr. A. G. Ramsey,** C.B.E., B.Sc.(Eng.), M.Inst.C.E., M.I.E.E., M.I.Mech.E., who is retiring from office after two consecutive years' service. Mr. Haldane is well known as a partner of Merz & McLellan, consulting engineers, and as a past-president of the Institution of Electrical Engineers (1948-49). He will deliver his presidential address at the opening meeting of the A.S.E.E. London lecture session on 17th October next at the Lighting Service Bureau.

Mr. F. W. Smith, supervising engineer with Rashleigh Phipps & Co., Ltd., has been elected chairman of the Association. Mr. Smith has the distinction of holding this office for the fourth time, having been chairman of the Association in 1921, 1930 and 1940. He has had considerable experience in the manufacturing and electrical contracting industries, having previously been engineer to Electromotors, Ltd., assistant to the general sales manager of Laurence, Scott & Electromotors, Ltd., manager of the Marine Department and specialist representative of Crompton Parkinson, Ltd., and a director of Burdette & Co., Ltd. **Mr. W. F. Parker,** A.M.I.E.E., has been elected vice-chairman of the Association and **Mr. E. J. Sutton,** M.I.E.E., hon. treasurer.

Mr. N. C. Hodson, of the Maxlume Lighting Section of Veritys, Ltd., has been appointed a director of the company.

Mr. D. Sullivan, sales manager of De La Rue Extrusions, Ltd., and De La Rue Floors and Furnishings, Ltd., was presented with the British Plastics Trophy at a Plastics Industry Golfing Society dinner at Grosvenor House on 6th June. The trophy was presented to Mr. Sullivan by Mr. C. E. Wallis, chairman of Iliffe & Sons, Ltd., publishers of *British Plastics*.

Mr. H. V. Emptage, public lighting superintendent at Margate since 1919, has retired.

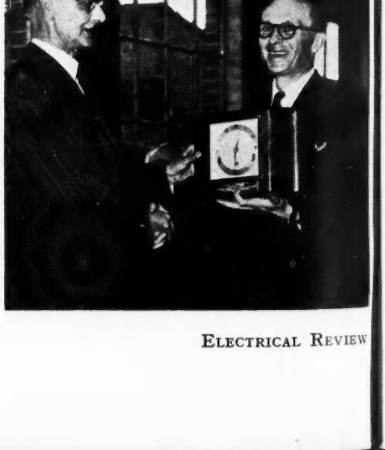
Mr. E. W. Thompson, M.A., chairman and joint managing director of John Thompson Water Tube Boilers, Ltd., has been elected a member of the Council of the British Engineers' Association.

The **Sloan Electrical Co.'s** Social Club recently spent a happy day at Ramsgate on the occasion of their annual outing, at which parties from head office and the depots at Ealing, Leyton, Peckham, Vauxhall and Watford participated.

The annual outing of the **Ekco Social and Sports Club** was held on 10th June when a large party of members and their friends went by coaches to Windsor for the day.

Mr. A. W. McArthur, M.I.E.E., works manager of factories of W. T. Henley's Telegraph Works Co., Ltd., at North Woolwich and Birtley, Co. Durham, recently completed fifty years with the company, and on 13th June at the North Woolwich works, Sir Montague Hughman, chairman of the Henley organization, handed to him a framed engrossment of a resolution of the board thanking him for his long and loyal service. He also received a gift of National Savings Certificates from the company. Sir Montague was accompanied by a representative gathering of directors and other senior officials of the company, and Mr. J. H. Savage, M.I.E.E., assistant works manager presided. In addition to the company's

Mr. A. W. McArthur receives from Mr. J. H. Savage, assistant works manager, Henley's North Woolwich works, a clock presented by employees to celebrate his fifty years' service



recognition, Mr. McArthur's colleagues and a large number of factory employees had contributed to a clock which was presented on their behalf by Mr. J. H Savage.

On 8th June, a luncheon was arranged to mark the winning of the E.D.A. public speaking competition by **Miss L. M. Kaye**, a member of the staff of Sub-Area No. 3 (Sheffield) of the Yorkshire Electricity Board. The luncheon was presided over by Mr. A. Haddock, Sub-Area manager, and the presentations were made by Mr. F. Newey, deputy chairman of the Board and a member of the E.D.A. Council. Mr. Newey presented to Miss Kaye the national trophy and replica, and the certificate and cheque for £5 as winner of the Yorkshire Area competition. He also presented to **Miss B. M. Ramsden,** of Sub-Area No. 5 (Wakefield), a certificate and cheque for £3 as winner of second prize. The third prize was secured by **Miss M. Bradshaw** of Sub-Area No. 3. Present at the luncheon were all the competitors who took part in the Area competition, also Ald. J. H. Bingham, J.P., member of the Yorkshire Electricity Board, Mr. A. Haselhurst, chief commercial officer, Mr. J. Fawcett of the Commercial Department and Mr. E. G. Gregory, public relations officer.

Yorkshire competitors who took part in the E.D.A. public speaking competition, showing Miss L. M. Kaye, the winner of the national trophy, with the shield. In the back row is Mr. J. Fawcett, of the Commercial Department at the Area headquarters of the Yorkshire Electricity Board

Mr. C. J. Misselbrook, B.Sc.(Eng.), F.I.E.S., who rejoined Siemens Electric Lamps and Supplies, Ltd., on 5th June as manager of the company's Illuminating Engineering Department, was educated at St. Olaves Grammar School and received his technical training at the Northampton Polytechnic. He was with Holophane, Ltd., from 1935 to 1937, when he joined the Siemens organization. After eleven years with them Mr. Misselbrook went to Troughton and Young (Lighting), Ltd., as senior illuminating engineer, in which capacity he served until taking up his present appointment with Siemens.

Mr. C. J. Misselbrook

In referring to the appointment of **Mr. M. MacKenzie** as electrical engineer to the Public Works Department, Hong Kong, in our 9th June issue, we incorrectly stated that he was an associate member of the Institution of Civil Engineers. This should have read associate member of the Institution of Water Engineers. In addition to the other qualifications mentioned in our notice, Mr. MacKenzie is an associate of Heriot Watt College, Edinburgh.

Three changes of personnel have been made in the Radio Department of the General Electric Co., Ltd. **Mr. W. A. C. Maskell**, who has been assistant manager for four years is now deputy manager. **Mr. R. G. E. Mayo** is now assistant manager (broadcasting) and Mr. A. E. Potton is assistant manager (batteries). Management of the department is still the responsibility of **Mr. M. M. Macqueen.**

Mr. G. S. Bone has joined the British Vacuum Cleaner and Engineering Co., Ltd., on the sales management side, to take charge of an important section of the company's activities. He will be mainly concerned with policy and sales promotion matters, and as liaison officer between the management and the Area Electricity Boards.

The Tunbridge Wells Branch of the **Electrical Association for Women** held a whist drive on 8th June, the proceeds of which, amounting to about £15, are being given to the Electrical Industries Benevolent Association. Mr. T. W. Dann, M.Eng., M.I.E.E., chairman of the Kent Branch of the E.I.B.A., and district mana-

ger of the South Eastern Electricity Board, Tunbridge Wells, acted as M.C. Lady Simpson (president of the local E.A.W. branch) presented the prizes, which were given by local contractors and members of the E.A.W. committee.

For their second production the **Portland Players** (the B.E.A. Amateur Dramatic Society) chose "Ladies in Retirement" by Edward Percy and Reginald Denham, a play with one or two rather difficult parts. The Players did well, especially Renee Futcher, who well portrayed "Ellen Creed," a hard-driven spinster forced by circumstances to murder her benefactress. Her childlike sisters were Gloria Henshaw and Margaret Stratton. "Lucy," a maid, was played by Jean Ward, "Leonora Fiske" by Nip Nunn and "Sister Theresa" by Joan Forster. Lawrence Clarke had the only male rôle, "Albert Feather." After last Friday's performance Mr. H. F. Carpenter (secretary, B.E.A.) expressed appreciation of the players and of the work of Mrs. F. M. Manning, the producer, Mr. K. Wheeler, the stage manager, and Mr. S. J. Brown (lighting effects). The Players are staging "See How They Run" (Philip King) next December.

OBITUARY

Mr. W. A. Mombrun.—The death occurred on 12th June of Mr. W. A. Mombrun, manager of the Dublin branch of the General Electric Co., Ltd. Mr. Mombrun, who was sixty-four, joined the G.E.C. in 1899 and had recently completed fifty years' service with the company. Although he was born in Tottenham, London, he lived for over forty-five years in Dublin.

Mr. A. Clark.—The death is reported of Mr. Alfred Clark, which occurred on 16th June at the age of seventy-six. Mr. Clark, who was born in New York, was one of the pioneers of the gramophone industry, being associated with Edison. He came to England in the late nineties and later became managing director of the Gramophone Company. When that company was merged in Electric & Musical Industries, Ltd., he became the first chairman and the first president of the new organization. He retired three years ago. Mr. Clark was chairman of the Radio Industry Council in 1945.

Mr. E. V. Cheney.—The death occurred on 8th June, in his sixtieth year, of Mr. Edward Vivian Cheney, London district engineer, B.T.H. Construction Department. Mr. Cheney, who had spent thirty-nine years in the company's service, was educated at Caterham School, Surrey, and obtained his first technical training as a pupil with the India Rubber, Gutta Percha and Telegraph Works Co. at Chepstow, Mon. He studied at the Finsbury Technical College (City and Guilds of London) from 1909 till 1911, when he joined the British Thomson-Houston Co. in the Test Department, being transferred to the Construction Department, London District, in 1914. After serving in the Royal Artillery and R.A.S.C. from 1914 till 1919 he rejoined the B.T.H. Construction Department, first in the Sheffield and later in the Manchester district. In 1920 he went to Birmingham as district engineer, and in 1929, after being attached to the Rugby head office construction staff for three years, followed by three years in a similar position at Willesden, he was appointed London district engineer.

Mr. R. Daw.—The death occurred on 14th June at the age of fifty-eight of Mr. Reginald Daw, A.M.I.E.E., section head (operations and maintenance), Engineering Department, with the South Eastern Sub-Area of the London Electricity Board. Mr. Daw was borough electrical engineer and manager at Dartford before vesting day. He entered the electricty supply industry in 1904, and all his working life (before vesting day) was spent with the Dartford undertaking.

Mr. A. B. Mudie.—The death occurred on 19th May of Mr. A. B. Mudie, managing director and founder of Mudie's Electrical Co., Ltd., Birmingham. Mr. Mudie is succeeded by his son Mr. D. B. Mudie, deputy managing director.

Mr. William George Richards, publicity manager of Marconi's Wireless Telegraph Co., Ltd., died at his home in Chelmsford on 15th June at the age of sixty-one.

WILLS

Mr. V. J. Perry, for twenty-five years on the sales staff of the Revo Electric Co., Ltd., who died on 18th January last, left £3,541 gross (£3,496 net).

Mr. C. F. Mounsdon, former area manager, East Kent, of the Sevenoaks and District Electricity Co., Ltd., who died on 2nd December last, left £ 6,958 gross (£6,909 net).

Mr. P. A. C. Lucette, B.Sc., A.M.I.E.E., of Cuttlestone House, Penkridge, Staffs, switchgear contracts manager at the Stafford works of the English Electric Co., Ltd., who died on 25th August last, left £4,061 gross (£3,951 net).

Mr. A. H. Avery, A.M.I.E.E., formerly technical director and adviser to the Electrical Department of George Kent, Ltd., Luton, who died on 10th December last, left £13,094 gross (£12,516 net).

Mr. J. W. Smith, chief buyer for Electrolux, Ltd., who died on 5th January last, left £10,038 gross (£9,668 net).

Commerce and Industry

Nationalization of Building Suggested
London Tramway Conversion Costs

A SCHEME for nationalization of the building industry has been drawn up by the National Federation of Building Trades Operatives for presentation at the Federation's annual conference. It is said in the pamphlet setting out the scheme that in the building industry 963,600 "operatives" are employed by 122,800 firms, the vast majority of which (106,700) employ up to and including ten operatives. Only 126 firms employ 500 operatives or more. The Federation suggests that only firms employing over 20 men or having an annual turnover of £10,000 shall be included in the scheme.

It is a point for argument, says the Federation, whether electric wiring and contracting should be included, but the view is expressed that it should "for the equipment of a building with electrical apparatus is as much a section of building as its equipment with gas and plumbing apparatus."

The first step in the sequence of nationalizing the building industry lies in the conversion of the manufacture of building materials (among which are mentioned electrical apparatus and equipment) into a State concern.

Ordnance Factory Losses

In his comments on the finances of Government trading and commercial services for 1948-49, the Comptroller and Auditor General (Sir Frank Tribe) refers to losses ranging from 50 to 335 per cent of selling prices on ceramics and electrical appliances produced in Royal Ordnance factories. He says that heavy initial expenditure was incurred in programmes of manufacture to meet estimated requirements for housing, but demand fell and the programmes were not completed. Some orders have been partly cancelled and production of other goods has been suspended or has ceased earlier than had been expected. As a result, substantial expenditure on capital items and other initial work and on provision of unused components and materials has not been recovered.

The primary purpose of keeping these factories in production during peacetime is to maintain war potential. Under arrangements approved by the Treasury trade prices were generally to be the estimated factory costs but there was discretion in certain circumstances to accept lower trade prices if the difference was not more than 15 per cent of the trade prices.

"Lighting Service"

The spring number of the Lighting Service Bureau's magazine is again handsomely produced with copious illustrations, some in colour. The articles cover such subjects as the Scottish and Leeds Lighting Service Bureaux, the Festival of Britain, the new silica lamps, "brightness engineering," and many new lighting developments.

Display of Henley Products

The accompanying picture shows part of a comprehensive display of Henley products which was recently staged at the foundry of Oakley Bros., a subsidiary company of W. T. Henley's Telegraph Works Co., Ltd. The exhibition was very well attended by

Henley products displayed recently at Oakley Bros. foundry

Midland B.E.A. officials and electrical contractors. This was the first comprehensive display of this nature held by the company since the war.

N.Z. Sales Tax Exemptions

The *New Zealand Electrical Journal* reports that toasters, carpet sweeping and floor polishing machines, all kinds of laundry irons and vacuum cleaners have been freed from sales tax.

Plea for Trams

At one of last week's sessions of the tribunal which is considering the application of the British Transport Commission for sanction to a scheme for equalizing fares in the London area, Mr. W. A. H. Parker, M.I.E.E., electrical consultant, expressed the opinion that the London tramway system should be continued. He said that there had been no capital expenditure upon trams since 100 were purchased about 18 years ago. The cost of buses to replace trams would be between £6,000 and £7,000 each. Mr. Parker referred to a new type of tramcar which would carry 84 passengers at a cost of 2.2d per car mile. New diesel-engined buses, carrying 56 passengers, would have an operating cost of 2.95d per car mile.

He pointed out that trams used electricity from home-produced coal whereas buses depended upon imported oil.

"Metrovick" History

It is now almost a year since the Metropolitan-Vickers Electrical Co., Ltd., celebrated its jubilee, and as an additional means of marking the occasion the company has produced an excellently illustrated 250-page book which sets on record an historical account of its activities in the field of electrical manufacturing from 1899 until the present time. A brief history of the company appeared in the *Electrical Review*, 1st July, 1949, and apart from this material, in of course far greater detail, the present work mentions many outstanding events and personalities. An indication is also given of the contributions to electrical engineering progress generally which the company has made, and the book emphasizes throughout the importance of personnel training to manufacturing efficiency.

Electronic Flash Photography

The outstanding advances made in electronic flash photography during recent years are displayed in an exhibition now being held at the Holborn Gallery of Ilford, Ltd., 101, High Holborn, W.C.1. This exhibition, which has been organized by Ilford, Ltd., in collaboration with Mullard Electronic Products, Ltd., will remain open to the public for about six weeks. Of particular interest among the exhibits are photographs illustrating how electronic flash tubes are now being employed in science, medicine and industry. One specially striking picture shows an ordinary household electric lamp at the instant of breakage, but with the filament still alight. A representative selection of the latest Mullard electronic flash tubes is also displayed.

Industry and the Universities

During November last representatives of industry and the universities attended a conference at Ashorne Hill, near Leamington Spa, for the purpose of discussing and suggesting possible solutions to some of the problems common to both of them. A 94-page report on the proceedings of this conference is now available from the organizers, the Federation of British Industries, 21, Tothill Street, London, S.W.1, price 3s.

Electrical Housecraft for Teachers

The Electrical Association for Women is holding a Summer School of Electrical Housecraft open to science and domestic science teachers from all parts of the country, at King's College of Household and Social Science from 21st to 26th September.

E.D.A. Films for Venice

Two of the Electrical Development Association's educational films are among the British films to be presented at the 1950 Venice Film Festival in August. The films, which were chosen by the Standing Festivals Committee of the Association of Specialized Film Producers, comprise shorts and documentaries, scientific films, art documentaries and films for children. The two E.D.A. films selected are "What is Electricity" and "Electro-Chemistry."

Brook Motors Aberdeen Branch

Brook Motors, Ltd., has opened a branch at 124, Union Street, Aberdeen (telephone 21890).

Mr. W. J. Ward, of the Sheffield branch, has been appointed manager, and Mr. B. Sykes, A.M.I.E.E., formerly at the Brook Liverpool office, has been appointed assistant sales engineer at Sheffield in place of Mr. Ward.

Parnall Cookery Book

The new two-edition Parnall Cookery Book, just published, has been designed on functional principles. Two editions are necessary as the series EC5 and EC6 Parnall

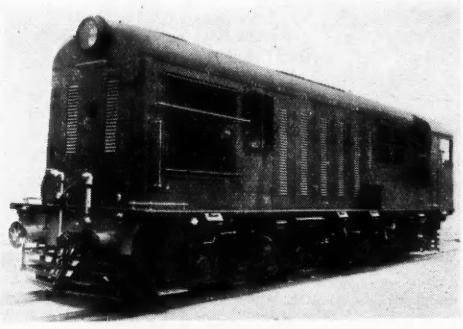
cookers are entirely different in construction from the series EC10 and EC12. These latter were produced specifically for export trade and have the grill (or broiler) inside the oven. Chapters in the cookery book describing the cookers and how to use them are different in the two editions. White plastic covers, gold blocked, can instantly be wiped clean with a damp cloth, a point of some importance. A copy will be presented with each cooker sold, but the book bears a price of 7s 6d, and is available from Parnall (Yate), Ltd.

Site-recruited Labour

An agreement between the National Federated Electrical Association and the Electrical Trades Union sets out conditions regarding site-recruited labour. Operatives taken into the employer's service on the site of a contract within the boundaries administered by a city, county borough, borough or urban district council are to receive travelling time and actual fares for the return distance from the council or other specified centre. In the case of other contract sites, journeymen electricians are to be paid 2s 6d a day; adult mates 2s and employees under 21 years 1s 6d. The agreement dates from 1st June.

Diesel-electric Locomotives for Tasmania

The first diesel-electric locomotive to be built in this country for Australia has recently been completed and shipped from Liverpool. It is of the Bo-Bo type, designed for general service on the Tasmanian Government Railways. Up to three locomotives may be operated in multiple when required. Operating either singly or in multiple unit the locomotives will be capable of handling every type of train running on the Tasmanian Government Railways, where severe gradients are encountered. The English Electric Co., Ltd., received an order for ten locomotives in 1947, followed by repeat orders for ten and twelve respectively in 1948 and 1949, bringing the total number on order to thirty-two. The mechanical parts have been designed by Vulcan Foundry, Ltd., in collaboration with the English Electric Co., Ltd. Vulcan Foundry, Ltd., are building the mechanical parts for the first twenty locomotives and the remaining twelve sets of mechanical parts will be built by the English Electric Co. who are supplying the power and electrical equipments for all thirty-two locomotives on order. The power equipment comprises an English Electric six-cylinder, four-stroke supercharged diesel engine, rated at 660 b.h.p. at 750 r.p.m., direct coupled to a six-pole traction type d.c. generator which supplies current to four axle-hung traction motors driving the road wheels through spur gearing.



An English Electric 660 b.h.p. diesel-electric locomotive built for the Tasmanian Government Railways

T.V. Aerial Factory

Belling & Lee, Ltd., have acquired a modern freehold factory at Liverpool for the manufacture of television aerials for the midlands, northern and Scottish areas and for overseas markets. Aerials for the Alexandra Palace area will continue to be assembled and packed in a section of the company's Enfield works. Production at the new factory is scheduled to commence in August.

Proposed Cross-Channel Television Link

Being firmly convinced of the value of expeditiously establishing a cross-Channel television link, the British radio industry is prepared, from its own resources, to install temporary apparatus to set up such a service at the earliest possible moment. This is stated in a memorandum which the Radio Industry Council has just submitted to the Postmaster-General.

The memorandum points out that there would be no difficulty in providing the necessary links from London to the English coast, across the Channel, and from the French coast to Paris via Lille, where a radio link to Paris is understood to be far advanced. The cost of the installation for a London-Paris service should not be high if full use could be made of existing plant

and facilities—for example, the B.B.C. experimental station at Wrotham, located on the line from London to the coast at Dover. Transmissions would be on the B.B.C. system of 405 lines.

Housecraft Advisers

At a recent committee meeting of the Association of Electrical Housecraft Advisers it was unanimously decided that it should be recommended that any woman accepted into the demonstration section of any Electricity Board should hold as a minimum qualification the E.A.W. Housecraft Certificate. It was also recommended that trainees should remain as showroom assistants until in receipt of their full domestic science qualifications and E.A.W. Housecraft Certificate.

Trade Announcements

Stability Radio Components, Ltd., has transferred its offices to Commerce Estate, Woodford Avenue, London, E.18.

The Gooding Electrical Co., Ltd., has removed its offices and works to 118, Judd Street, London, W.C.1 (telephone: Terminus 3543).

Robshaw Bros. (Rochester), Ltd., have been appointed sole distributors in the United Kingdom of Igranic jacks, plugs, rheostats and potentiometers.

Chang, Ltd., has appointed Mr. W. D. Watts, 53, Canford Lane, Westbury-on-Tryn, Bristol, as its area representative for South Wales and the West Country, which also includes Hampshire, Berkshire and Oxfordshire.

Mr. D. A. Hopkins has been appointed representative for the north west area, including North Wales, Lancashire and Yorkshire, of **Nettle Accessories, Ltd.,** Wythenshawe, Manchester.

Alexander Lightman, Ltd., Apex House, Gascoign Street, Leeds, 1, have been appointed wholesale distributors by **Sobell Industries, Ltd.,** of Sobell receivers to the furniture trade for Lancashire, Yorkshire, N. Wales, Cheshire, Northumberland, Westmorland, Durham and Cumberland.

C.W.C. Equipment, Ltd., is removing today (Friday) to 25, Manchester Square, London, W.1 (telephone: Welbeck 7941).

Supervisors' Handbook

A handbook which is intended for reference and use by foremen and charge hands in all its subsidiaries has been published by Tube Investments, Ltd. The aim of the handbook is to make available all the general information which foremen and charge hands require in the effective discharge of their jobs. This has been divided into three sections, Part I dealing with matters which concern all T.I. companies. Part II, prepared by subsidiary companies, deals with matters special to the company concerned, while Part III relates to technical details of the particular department.

Heating and Ventilating Fellowship

The Institution of Heating and Ventilating Engineers has decided to offer a Research Fellowship of £350 for one year; it may be increased in amount and duration depending on circumstances. The Fellow will normally work at the National College for Heating, Ventilating, Refrigeration and Fan Engineering, Borough Road, London, S.E.1, but he will be expected to visit other institutions having similar interests. The Research Committee of the Institution will consider applications early in August.

Annual Holidays

The Anchor Works, Leigh, of British Insulated Callender's Cables, Ltd., will be closed for the annual holidays from 8th to 15th July. The Prescott, Helsby, Huyton and Melling Works will be closed from 29th July to 7th August, and the Willenhall Foundry from 29th July to 8th August.

The works of the Liverpool Electric Cable Co., Ltd., will be closed from 14th to 24th July for the annual holidays.

The works of Hall Telephone Accessories, Ltd., will be closed for the summer holiday from 30th June to 10th July.

Profit-sharing Scheme

The thirty-sixth annual meeting and profit sharing with the employees of Horace Green & Co., Ltd., Cononley, Keighley, was held in the works canteen at the end of May. Mr. G. S. Green gave an address on national and international affairs, after which Mr. Horace Green briefly reviewed the history of the firm. He then said that the dividend on the wages earned throughout the year was a slight increase over last year, the average over 36 years being a little over 10 per cent. A vote of thanks to the directors was voiced by Mr. I. Wright and seconded by Mr. J. Richardson, and Messrs. A. Green and G. W. Green responded.

Catalogues and Lists

Venner Accumulators, Ltd., Kingston By-Pass Road, New Malden, Surrey.—Technical brochure and price list of lightweight silver-zinc accumulators.

Alliance Wholesale, Ltd., 92-93, Great Russell Street, London, W.C.1.—Priced catalogue (No. 494) of electric motors and miscellaneous industrial electrical plant.

CABLE TESTING IN FRANCE

220 kV Type for Continuous 200 MVA Duty

IN March, 1949, it was reported that British Insulated Callender's Cables, Ltd., had designed an underground power cable for continuous 200 MVA duty in service at 220 kV. In conjunction with a French cable firm (Tréfileries et Laminoirs du Havre) a 110 yd (100 metre) length of this cable has since been installed in the grounds of the Fontenay (Clamart) Laboratories (Electricité de France) for long-term field tests in view of the possible use of this type of cable on the French 220 kV network. Two other similar lengths have recently been laid at Fontenay, thus completing the three-phase test installation.

In order to comply with conditions laid down by Electricité de France, a 20 yd length complete with a joint and two sealing ends of the condenser-cone type has been subjected to a series of special tests in this country with very satisfactory results. For one of these tests 350 kV (2.76 times working voltage) was applied between the conductor and sheath for a period of twenty-four hours, followed by 450 kV (3.7 times working voltage) for one minute.

The culminating point of these tests was reached at the National Physical Laboratory on 9th May, when a series of impulse tests were carried out on a further length of cable, complete with joint and sealing ends embodying stabilizing-glazed porcelains. It was subjected to ten surges of 1,080 kV peak of the positive polarity, followed immediately by ten surges of 1,080 kV of the negative polarity. The results were entirely satisfactory and without incident. A week later similar surge tests were carried out in the presence of M. Maurice Laborde (chief engineer of research for Electricité de France) and again the cable and accessories sucessfully withstood them. These impulse tests are considerably in excess of those proposed by the International Electrotechnical Commission, which suggests a peak of only 800 kV for impulse tests on equipment connected with 220 kV overhead line systems.

The conductor of the single-core 220 kV impregnated pressure cable consists of 91/0.104 in (91/2.64 mm) stranded tinned-copper wires in circular form over which is applied a metallized paper screen. To protect the latter screen and to ensure positive contact with the lead sheath, a copper woven fabric tape is wound over the completed dielectric. As a protection against longitudinal and circumferential mechanical stresses narrow copper strips are laid along the sheath—a suitable bedding having been been interposed—and bound round with copper tapes. The cable is finally protected with a special anti-corrosion serving consisting of alternate rubber and bitumen impregnated tapes, the overall diameter being 3.94 in (10 cm).

The Fontenay testing station, at which the 220 kV cable is being installed, will be described in a paper to be read, by M. Laborde at the meeting of the Conference Internationale des Grandes Réseaux Electriques, which is to be held in Paris at the end of this month.

Church Lighting Code

ELECTRICAL contractors know that the installation or renewal of electric lighting in a church involves technical and aesthetic considerations as well as problems of safety arising from the extreme dampness of many churches and, above all, the question of how best to arrange the lighting so as to show up the architectural features to advantage without destroying the light and shade which is the essence of gothic art. After taking advice from architects, electrical engineers, the Cable Makers' Association and others, the Central Council for the Care of Churches of the Church of England has issued revised regulations governing the lighting of all Church of England churches. Part I gives advice to the clergy and church people concerned with the inauguration of a new lighting scheme, and Part II contains regulations for contractors. The pamphlet is published by the Church Information Board, Church House, Westminster, S.W.1, price, by post, 5d for Part I and II together, or 3d for single copies of Part II only.

Crane Makers' History

THE 75th anniversary of Ransomes & Rapier, Ltd., electrical crane makers, of Ipswich, fell during the war, and consequently the event passed unmarked. Now, in its 80th year, the company has published its history, written by Mr. S. Lewis, a director. The book is profusely illustrated with pictures of some of the many installations carried out by the company, and Mr. Lewis's breezy style makes excellent reading.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

The Power Securities Corporation, Ltd., held its annual meeting on 15th June when Mr. W. Shearer (chairman and managing director) said that their organization, which embraced the business of Balfour, Beatty & Co., Ltd., was fully employed during 1949 and the total capital value of work in hand at the close of the year was in excess of £30 million. Work was proceeding satisfactorily at the Staythorpe power station which they designed and were building for the B.E.A. The final installed capacity would be 360,000 kW and they had to date received authority to proceed with the installation of five 60,000 kW sets and fourteen 240,000 lb/hr boilers. Construction work was also proceeding steadily at the Carmarthen Bay power station where two 52,000 kW turbo-alternators and five boilers were being installed, in addition to which the installation of a 60,000 kW set and two further boilers would shortly be put in hand. This station would eventually have a total capacity of 345,000 kW. In addition to the foregoing they had in hand many other electrical engineering contracts in the United Kingdom totalling 900 in number. These included the construction of the northern part of a 275 kV line between Staythorpe power station and Sheffield which was the first time that this voltage would have been brought into service in this country. They were also engaged in electrical engineering work overseas.

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., reports a net profit for 1949 after all charges, including taxation and taxation relief in respect of initial allowances, of £21,422, as compared with £21,586 for 1948. The ordinary dividend for the year is unchanged at 7 per cent, less tax, depreciation reserve receives £6,000, general reserve, £2,119, and capital reserve, £7,000. Commitments outstanding for purchases of plant and machinery not delivered at the end of the year (covered by debenture stock issued in January, 1950), amount to £226,000 (against £170,000). The balance carried forward is £9,312 (against £10,228 brought in).

The British Electric Traction Co., Ltd., reports an aggregate net profit of the group for 1949-50 of £1,350,266, as compared with £1,177,989 for 1948-49, after providing £921,340 for taxation. The net profit attributable to the parent company is £1,172,628 (against £991,375), and after deducting the balance of profits retained by subsidiaries, the net profit of the parent company is £638,031 (against £704,101). It is proposed to pay a final dividend on the deferred stock of 17½ per cent making 32½ per cent for the year (against 50 per cent), and a dividend of 17½ per cent on the "A" deferred stock which was issued to deferred stockholders as a 200 per cent capital bonus. The total distribution on the deferred stocks for the year is equivalent to 22½ per cent on the total deferred stocks as increased by the capital bonus issue, and compares with 50 per cent on the deferred stock for the previous year. The sum transferred to undivided profits account is £254,748 (against £396,928 brought in).

The Madras Electric Tramways (1904), Ltd., reports a profit for 1949 of £800, as compared with £7,667 for the preceding year. No ordinary dividend is paid and the balance carried forward is £29,493.

Broadcast Relay Service, Ltd., reports a group trading profit for the year ended 31st March last of £1,007,282, as compared with £865,271 for the preceding year, and a consolidated net profit of £460,640 (against £338,711). The profit of the holding company is £136,122 (against £310,664) and it is proposed to pay a final ordinary dividend of 5 per cent, again making 13 per cent, tax free, for the year. The balance carried forward is £371,269 (against £356,700 brought in).

The Harland Engineering Co., Ltd., reports a consolidated net profit for 1949 of £51,113, as compared with £48,938 for 1948, of which £4,375 has been retained in subsidiary companies' accounts, leaving £46,738, to which is added £17,098 brought in, making £63,836 available. It is again proposed to pay an ordinary dividend of 7 per cent, less tax, including the proportion due on the recently issued additional shares, and to carry forward £28,531.

NEW COMPANIES

Ward & Goldstone (Ireland), Ltd.— Registered in Dublin 9th May. Capital £30,000. Electrical and mechanical engineers, etc. Directors: R. C. Maher, M. E. Rustin, M. A. Hogan, St. Leonards, Killiney, Co. Dublin, M. Cowan and B. Cowan.

Haynes & Fleeson, Ltd.—Registered 3rd June. Capital £2,000. Electricians and electrical engineers and contractors, etc. Directors: A. J. Haynes, J. K. Haynes and A. G. Haynes. Regd. office: 13, Hadfield Street Manchester, 4.

Technograph Printed Circuits, Ltd.—Registered 31st May. Capital £50,000. To acquire inventions and processes relating to the manufacture or use of electrical and electronic apparatus and equipment, including in particular circuits, fuses and similar devices and accessories manufactured or produced by the processes known as Technograph Processes, etc. Subscribers: H. V. Strong and T. V. Strong. Solicitors: Frere Cholmeley and Nicholsons, 28, Lincoln's Inn Fields, W.C.2.

Redgrave Engineering Co., Ltd.—Registered 5th May. Capital £5,000. Manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, etc. Directors: R. Redgrave, J. M. Howe and F. G. Stringer. Regd. office: Knighton Chambers, Aldwick Road, Bognor Regis, Sussex.

INCREASES OF CAPITAL

Morphy-Richards, Ltd.—Increased by £50,000, in 250,000 ordinary shares of 4s, beyond the registered capital of £150,000.

British Tungsram Radio Works, Ltd.—Increased by £35,000, in £1 ordinary shares, beyond the registered capital of £10,000.

International Electrical & Engineering Trust, Ltd.—Increased by £49,900, in £1 ordinary shares, beyond the registered capital of £100.

LIQUIDATIONS

Wells Pridgeon Electrics, Ltd.—In voluntary liquidation. Meetings 3rd July, at 20-21, Lawrence Lane, Cheapside, London, E.C.2, to receive an account of the winding-up by the liquidator, Mr. A. E. Attwood.

Greater London Power Co., Ltd.—Winding up voluntarily. Liquidator, Mr. A. J. Jenkins, British Electricity House, Great Portland Street, London, W.1.

Kirby Hill Electric, Ltd.—In voluntary liquidation. Meeting 3rd July at the offices of Hand & Co., Fletcher Chambers, Fore Street, Birmingham, to receive an account of the winding-up by the liquidator, Mr. W. L. Hand.

Rushlite Batteries, Ltd.—Meetings 3rd July at 4, Princess Street, Wolverhampton, to receive an account of the winding-up by the joint liquidators, Messrs. R. F. Bendall and A. Blower.

Prince's Electric Clocks, Ltd.—Members' voluntary winding-up. Meeting 6th July at 4B, Frederick's Place, Old Jewry, London, E.C.2, to receive an account of the winding-up by the liquidator, Mr. D. H. Whinney.

Llanidloes Electric Light Co. (1926), Ltd.—In voluntary liquidation. Meeting of members on 10th July at the Town Hall, Llanidloes, to receive an account of the winding-up by the liquidator, Mr. L. S. Deacon.

Howard V. Jones (Wolverhampton), Ltd.—Winding up voluntarily. Liquidator, Mr. R. F. Bendall, 174, Edmund Street, Birmingham.

BANKRUPTCIES

W. T. Spencer, 376, Oldham Road, Newton Heath, Manchester, electrician.—First and final dividend of 8s in the £ payable 23rd June at the Official Receiver's office, 20, Byrom Street, Manchester, 3.

L. C. Overton, King Street, Bakewell, Derbyshire, electrician.—First and final dividend of 1s in the £, payable 23rd June at the Official Receiver's office, 22, Regent Street, Park Row, Nottingham.

TRADE MARKS

APPLICATION has been made for the registration of the following trade mark. Objections may be entered within a month of 7th June.

WASP. No. 668,492. Class 9. Electric burglar alarm systems and electric alarm bells.—J. Westaway, 18, Harrow Road, Brooklands, Sale, Ches.

No. B673,210 (design). Class 9. Electric storage batteries.—GNU Accumulator Co., Ltd., 246, Cavendish Road, London, S.W.12.

SONEX. No. 681,410. Class 9. Electric switches, plug and socket connections, terminals, fuse fittings, included in Class 9, and electric resistances.—George H. Scholes & Co., Ltd., Wylex Works, Sharston Road, Wythenshawe, Manchester.

DAVU. No. 686,904. Class 9. Insulated electric wires.—J. Day & Co. (Derby Works), Ltd., Harrow Manor Way, Abbey Wood, London, S.E.2.

MINEMASTER. No. B684,617. Class 11. Electric lighting sets for use by miners. VAPRUFE. No. 684,618. Class 11. Electric lighting sets for use in mines and places where explosive conditions exist.—Alkaline Batteries, Ltd., Union Street, Redditch, Worcs.

EXINA. No. 687,566. Class 11. Electric torches and parts thereof included in Class 11.—Bethell Brothers, Ltd., 87-89, Paul Street, London, E.C.2.

MEM. No. 676,946. Class 17. Insulation materials, gutta percha, rubber, balata, imitation balata, asbestos, mica, non-mouldable plastics included in Class 17 in the form of sheets, blocks, rods and other shaped pieces, and articles made from all these substances and included in Class 17.—Midland Electric Manufacturing Co., Ltd., M.E.M. Works, Reddings Lane, Tyseley, Birmingham.

FINANCIAL SECTION

STOCKS and SHARES

THE atmosphere in the Stock Exchange remains, on the whole, favourable to those who are interested in securities. Since a week ago the falls, for once in a way, outnumber the rises, and this is due rather to lack of interest on the part of the investing public than to any particular pressure of selling.

Profit-taking, no doubt, accounts to some extent for reactions which took place in E. K. Cole, 17s 6d, Cossor, 8s 6d, De La Rue, 25s, Decca 16s, and Hoover, 44s 3d. The radio market is a little easier as a whole. On the other hand, Pye deferred at 33s 9d are 1s 3d to the good: Telephone Properties, 18s 9d, and Walsall Conduits are equally better. Hackbridge & Hewittic Electrics at 14s are 1s 6d up. Small improvements made Babcock 63s, Crabtree 37s 6d, Metal Industries 42s 6d and Allen West 9s. Telephone Properties recovered to 18s 9d.

B.E.T. Dividend

British Electric Traction deferred stock jumped 20 points, to 470, on the announcement of a final dividend of 17½ per cent on the capital as increased six months ago by the 200 per cent share bonus. Last year's final of 35 per cent would be equivalent to 11.2/3 per cent on the present amount. On the same basis, this year's total is 22½ per cent, against 16.2/3 per cent. With the year's profits showing a further increase, the payment is still well within the group's earning capacity. A large interest is held by B.E.T. in the Broadcast Relay Service company, whose results just published disclose that the progress of the business lost none of its momentum in 1949, group trading profits topping the million mark. There is no change in the dividend at 13 per cent tax free, which provides a 5½ per cent gross yield on the 5s shares at 21s 6d. B.E.T. deferred pay 4¾ per cent on the money at the new rate of dividend.

Sound Investments

Anglo-Portuguese Telephone new shares are being dealt in at a premium of 4s 9d on the price of 21s at which they were offered to shareholders. To-day, 23rd June, is the last for renunciation purposes. Cable and Wireless are expected to post by the end of this month allotment letters for the new stocks resulting from the reorganization. The 4 per cent loan stock is 10s down at 101.

Among stocks currently on offer in the industrial market are reasonably large lines of C. A. Parsons, yielding £4 8s 3d per cent (at 68s) on one of the best-covered dividends in the list; of International Combustion at 16s 1½d, yielding £4 13s per cent; and of Babcock & Wilcox at 63s 3d, yielding nearly 4¾ per cent. Crompton Parkinson 5s shares are available at 12s 6d, the indicated return being 4½ per cent. By present standards, these are all very fair returns.

Television Prospects

In a market report, a firm of Stock Exchange dealers in television shares brings out the principal points in their favour. Television licences in March of this year numbered 345,000, more than double the number in issue a year ago, and nearly 50 per cent above the end-1949 figures. Eight more B.B.C. transmitters, bringing 80 per cent of the population within range, are due to be in operation by 1954. Orders have been placed with E.M.I. and Standard Telephones for vision and sound equipment respectively, for the new Scottish and Bristol stations; orders for ten new cameras have been divided between Pye and Marconi. Officials of the industry report that 360,000 sets have been produced since the war, and estimate that manufacturers are now on a production programme of over a thousand sets a day for the home market. Overseas markets have big possibilities; witness Pye's entry into the American field.

Shares and Yields

The circular quoted above includes the particulars of a dozen companies largely interested in the television field. "Emmies" are shown at 25s to yield 3.2 per cent, and Pye deferred, at 33s 3d yielding 3¾ per cent on the basis of the latest dividends. Ekco and Thorn Electrics, both about 17s 6d, give 5¾ per cent. Peto Scotts at 2s 9d return nearly 5½ per cent, Deccas at 16s 3d pay 6.9 per cent and McMichaels over 8¼ per cent at 4s 9d. Cossors, Scophony-Baird and Ultra are at present out of the dividend list. Prices, it should be mentioned, are moving fairly widely from day to day. The list of companies referred to above excludes the heavy electrical engineering companies having television subsidiaries.

ELECTRICITY SUPPLY

Waterworks Power Plan Vetoed

Industrial Expansion in South Western Area

RECENTLY the South Wales Electricity Board completed negotiations with Birmingham Corporation for taking a small bulk supply from the Corporation's water undertaking at Elan Valley. This would have been made possible by installing two sets of greater capacity in place of the existing small sets at Caban-Coch Dam. It was estimated that, after meeting the requirements of the waterworks, a surplus of 1.4 million kWh per annum would be available to the Board. The two sets, generating at 415 V, three-phase, would be run to give a constant output of 300 kW, while the undertaking's requirements would not be likely to exceed 100 kW. The cost of the larger scheme was estimated at £20,318, compared with £13,800 for plant sufficient only to meet the undertaking's needs. At last week's meeting of the City Council, however, it was stated that the proposed scheme had been rejected by the Ministry of Health. A new approach may be made through the Electricity Board.

Year's Progress in South-West

During 1949-50 the South Western Electricity Board connected 24,000 new consumers, bringing the total number to approximately 553,000. Of these new consumers about 18,000 were in urban areas, including some 4,000 in Bristol, 1,500 in Plymouth and just over 1,000 in Bath. The most marked increase in the use of electricity was in the industrial field, in which the additional 400 million kWh consumed represented an increase of about 10 per cent. In Bristol alone consumption increased by 19 per cent to 207 million kWh. Some 8,000 kW of new load was connected during the year and negotiations were proceeding for new supplies which should lead to more than double this amount of new load being added during 1950-51. The 6,000 new premises connected in rural areas included over 800 farms. Surveys of rural undeveloped areas were completed in 550 parishes out of a total of 950.

Giving these facts at the last meeting of the Consultative Council, Mr. S. F. Steward said that it was the Board's objective to build up a complete electricity service. Referring to installation work, he stated that the Board would provide this service wherever the interests of the consumer demanded it. Contractors had, however, their own important part in developing electricity supply, and he welcomed collaboration with them aimed at developing the public's interest in electricity. In particular, it was essential to develop the use of electricity on farms which already had a supply. At the present time only about half of these farms used electricity outside the farmhouse.

Plea for Earlier Supply

Some thirty owner-occupiers and tenants of properties in the High Eldwick district near Bingley and bordering Ilkley Moor have organized themselves to protest against the lack of either electric or gas lighting in the area. They discussed the problem at a recent meeting and agreed to send a letter to Mr. Geoffrey Hirst, M.P. for Shipley Division, and Col. Banks, M.P. for Pudsey Division, pointing out that the Yorkshire Electricity Board could not promise a supply earlier than late 1952, and as they were not convinced by the technical and financial arguments so far advanced to justify the delay, they requested the Members to use their good offices to expedite the facilities so urgently needed.

Scheme Delayed

The Yorkshire Electricity Board has informed Driffield U.D.C. that because of the restrictions on capital expenditure it cannot give an assurance that electricity will be available in the near future for 48 houses on the Eastfield Road estate. The Council had already invited tenders for electrical installations in these houses and in view of the Board's letter has decided to destroy the thirteen tenders received and readvertise later.

Motor-car Factory

Referring to the large extension scheme of Vauxhall Motors, Ltd. (*Electrical Review*, 7th April, 1950), the Chilterns Sub-Area of the Eastern Electricity Board gives an outline of the arrangements for affording an additional 8 MW supply (in the near future

the total loading will be in the region of 20 MW). To avoid any wastage of floor area four substations have been constructed in the roof steelwork of the new single-storey factory, one being of 3,000 kVA capacity and three of 2,000 kVA each. In addition, there are 4,000 kVA of single-phase transformers to deal entirely with welding load; these also are contained in the roof steelwork together with the necessary switchgear and five 750 kVA synchronous condensers for power factor correction. Distribution at 440 V is by overhead primary busbars of 1,600 and 1,250 A capacity, with 16,000ft of 300 A busbars for supplying machines requiring some 8,000 motors from f.h.p. to 220 h.p. Heating is by high-pressure hot water and with the ventilation plant requires sixteen 35 h.p. motors. To supply the hot water for heating a new boiler house is under construction; two 500 kVA transformers have been installed for the auxiliaries. A gas-producing plant is being installed and requires 250 h.p. of motors. Lighting of the factory is by 3,875 double-tube 5ft fluorescent fittings.

Boiler Make-up Water

The Merseyside & North Wales Division has suggested to the Inland Waterways Executive that the Shropshire Union Canal should be used as a conduit for bringing boiler make-up water from the River Dee to the power station which it is proposed to construct at Ince. The Executive has agreed in principle and detailed negotiations are in progress.

Cheaper Electricity in Scotland

An announcement about the North of Scotland Hydro-Electric Board's tariff for domestic and business premises was made by Mr. G. T. McGlashan, chairman, at a meeting of the Electricity Consultative Council at Perth on 15th June. As an experiment, he said, the Board had agreed last year to introduce, during the two winter quarters, a fourth block at ½d per kWh in the Lochaber and the Skye and Lochalsh areas. Results of the experiment there had been so satisfactory that the Board had decided to continue the arrangement, and to extend it to domestic and business consumers in the whole of the Board's area. It would be brought into effect during the two ensuing quarters. The present tariff comprised three blocks—5⅛d, 1d, and ¾d. In future the number of kWh charged at ¾d for a four-roomed house would be 324 in the winter quarters, and all further kWh at ½d. The Board had taken this step to encourage the use of electricity in view of the large hydro-electric power stations now coming into operation. Because of this increasing production the Board was hopeful that there would be no need for load-shedding this winter in its area.

It was reported that the number of new consumers connected to the Board's mains in the first five months of this year was 8,786, of whom nearly 6,000 were in rural areas, villages and small burghs.

Electricity in Shetlands

First islands in Shetland to get electricity from Lerwick will be Trondra (population 90) and Burra Isle (population 760), and it is expected that the supply will be available this summer. Submarine cables (11 kV) have been laid by British Insulated Callender's Cables from the west side of the mainland to Trondra, a distance of 500ft, and from the south end of Trondra to Burra, more than 1,000ft.

Margate Illuminations

An illumination scheme costing £5,500 is being carried out for Margate Corporation, extending along the entire sea front. This scheme utilizes 10,000 "Beeantee" interchangeable festoon striplighting holders and set pieces, etc., and the main contractors are H. E. Walkden (Kent), Ltd.

Water Power in Canada

A COMPREHENSIVE survey of "Water Power in Canada: Its Potentiality, Development and Utilization," was presented last week by Dr. Huet Massue, engineer-economist to the Shawinigan Water & Power Co., to a meeting held by the British Electrical & Allied Manufacturers' Association.

With the aid of 32 coloured charts Dr. Massue indicated the extent of Canada's water power, the growth of installations, precipitation and run-off, the benefits of river regulation, the water power potentiality, sources of coal, trend of production of electricity, the pattern of utilization, revenue from sales, cost of electricity, the relative importance of the cost of domestic electricity in the Canadian family's budget and also in manufactures of Canada, the power requirements of the most important industries, British and American national payments, and trends of trade investment and production in Canada.

Accompanying Dr. Massue at the meeting were Mr. James McCrory, president of the Shawinigan Engineering Co., and Mr. W. R. Way, general superintendent of the company. All three gentlemen are delegates to the forthcoming World Power Conference. They were welcomed by Mr. D. Maxwell Buist, B.E.A.M.A. export director.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

20109. Sperry Gyroscope Co., Inc.—Frequency-multiplier electron-discharge apparatus. 9th October, 1942. (Divided out of 640895.) (640899.)

1945

4850. British Thomson-Houston Co., Ltd.—Glow-discharge switches for starting electric-discharge devices. 27th February, 1945. (641071.)

12816. Sperry Gyroscope Co., Inc.—Resonant-space resonators associated with high-frequency electron-discharge apparatus. 22nd May, 1945. (640900.)

1946

23156. Radio Corporation of America.—Navigation aiding radio systems. 2nd August, 1946. (640903.)

26836. Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—Metal rectifiers. 6th September, 1946. (Convention date not granted.) (640906.)

27133. Paramount Industries, Inc., and Sobel, A. D. —Fluorescent electric hand lamp. 10th September, 1946. (641077.)

30703. Philips Lamps, Ltd.—Apparatus for the acceleration of electrons. 15th October, 1946. (640910.)

36301. Sperry Products, Inc.—Apparatus for inspecting a medium with supersonic waves. 9th December, 1946. (641081.)

1947

3709. Standard Telephones & Cables, Ltd., and Hill, S. S.—Arrangements for transmitting electric signals occupying a wide frequency band over narrow-band circuits. 6th February, 1948. (640986.)

4061. Philips Lamps, Ltd.—Velocity modulation devices for producing ultra-high-frequency oscillations. 12th February, 1947. (641084.)

6916. Westinghouse Electric International Co.—Magnetrons. 12th March, 1947. (641086.)

8380. Radio Corporation of America.—Neutralized amplifier circuits. 27th March, 1947. (641087.)

9137. Haefely & Co., Ltd., E.—Device for the measurement of voltage-impulses of short duration. 3rd April, 1947. (640918.)

10445. Marconi's Wireless Telegraph Co., Ltd., and Jefferson, H.—Amplifier and repeater arrangements with automatic gain control. 13th January, 1948. (640920.)

13518. Sperry Products, Inc.—Supersonic inspection apparatus. 20th May, 1947. (641092.)

14416. Kemsley Newspapers, Ltd., and Harrison, A. —Electromechanical telecommunication apparatus. 31st May, 1948. (641093.)

18657. Philips Lamps, Ltd.—X-ray tubes with disc-shaped rotary anodes. 14th July, 1947. (641096.)

20150. Siemens Electric Lamps & Supplies, Ltd., and Cumming, H. W. L.—Circuit arrangements for high-pressure metal vapour electric-discharge lamps. 23rd July, 1948. (641099.)

20441. British Thomson-Houston Co., Ltd., and Knight, H. de B.—Mercury vapour electric-discharge devices. 27th July, 1948. (641100.)

20799. Westinghouse Electric International Co.— Electric-discharge devices. 31st July, 1947. (641101.)

20846. Bendix Aviation Corporation. — Electric starting systems for engines. 31st July, 1947. (640940.)

21672. British Thomson-Houston Co., Ltd.—Magnetic induction accelerator magnet structures. 7th August, 1947. (641103.)

22472. Marconi's Wireless Telegraph Co., Ltd.— Glass for forming glass-to-metal seals. 13th August, 1947. (640943.)

23450. British Thomson-Houston Co., Ltd.—Dish-washing apparatus. 25th August, 1947. (640944.)

25845. Crompton Parkinson, Ltd., and Balaam, N. B. —Glow-discharge thermal switches and circuits incorporating such switches. 15th September, 1948. (640948.)

28880. General Bronze Corporation.—Refrigerators. 29th October, 1947. (641006.)

29210. Automatic Telephone & Electric Co., Ltd., and Hughes, J. — Telephone systems. 1st November, 1947. (640951.)

29668. Siemens Bros. & Co., Ltd., and Hailey, A. M. —Electric counting and totalling systems. 29th October, 1948. (640952.)

30881. Ward & Goldstone, Ltd., and Couyoumdjian, A. O.—Electrical plug-and-socket connections. 20th January, 1949. (641111.)

31340. British Thomson-Houston Co., Ltd.—Piezo-electric crystal holders. 26th November, 1947. (641011.)

33450. Metropolitan-Vickers Electrical Co., Ltd., and Rumble, R. V.—Braking equipment control systems for mine hoists and like winding gear. 29th September, 1948. (641115.)

33785. Ericsson Telephones, Ltd., and Distin, L. S. —Circuits for electromagnetic interrupters. 11th December, 1948. (641019.)

34044. Akt.-Ges. Brown, Boveri & Cie.—High-tension windings for transformers. 23rd December, 1947. (641020.)

34223. Aluminium Co. of America.—Installations for cathodically protecting underground metallic structures. 24th December, 1947. (641021.)

34224. Aluminium Co. of America.—Anode packages for use in cathodic systems for protecting underground metallic structures. 24th December, 1947. (641022.)

1948

3003. Soc. le Carbone-Lorraine.—Electric battery cells using air as a depolarizer. 2nd February, 1948. (Cognate application 3004, 13th May, 1947.) (641028.)

3138. Standard Telephones & Cables, Ltd., Webb, L. H., and McLellan, H. E. S.—Polarized electromagnetic relays. 28th January, 1949. (641117.)

6631. Blackband, W. T.—Sealing of radio and like electrical components. 1st April, 1949. (641119.)

11000. Metropolitan-Vickers Electrical Co., Ltd., and Whyman, F.—Electrically driven railway vehicles. 14th April, 1949. (641123.)

12621. Dehn, S. G. (Soc. Anon. de Telecommunications).—Machines for making high-frequency cables. 7th May, 1948. (641037.)

12945. British Insulated Callender's Cables, Ltd., Bannister, L. C., and Holland, J.—Electric insulators. 10th May, 1949. (641040.)

13425. Jackson, R. A. F.—Cooking stoves heated by gas or electricity. 18th May, 1949. (641044.)

13731. British Mechanical Productions, Ltd., and Shorey, L. W.—Contact pins for electrical pin-plugs. 20th May, 1949. (641128.)

14099. Paramount Industries, Inc., and Sobel, A. D. —Fluorescent electric hand lamp. 10th September, 1946. (Divided out of 641077.) (641129.)

15013. British Thomson-Houston Co., Ltd.—Methods of brazing. 3rd June, 1948. (641045.)

16201. Fairweather, W. C. (Singer Manufacturing Co.).—Motor-driven fan units for use in vacuum cleaners. 16th June, 1948. (641134.)

16556. "Diamond H" Switches, Ltd., Turner, C. A., and Walton, G. H. F.—Indexing mechanism for rotary electric switches. 1st March, 1949. (641135.)

19079. Wild-Barfield Electric Furnaces, Ltd., Barfield, R. H., and Gibbs, M. G.—Heating of metal strips. 13th May, 1949. (641053.)

21003. Glendinning, W. G., and Earwicker, G. A.—Electrically heated transparent panels. 29th July, 1949. (641147.)

21213. English Electric Co., Ltd., and Franklin, E. B.—Inductive windings. 29th July, 1949. (641056.)

22286. Cann, W. A. H., and Lees, D. M.—Two-part electric couplings. 22nd September, 1949. (641150.)

22314. Marconi's Wireless Telegraph Co., Ltd., Parker, G. P., Brown, T. T., and Dimond, W. J.—Connection and mounting arrangements for radio and similar electrical components. 24th August, 1948. (641152.)

24080. Chance Bros., Ltd., and Hallett, L. B. H.—Electric contactors. 18th August, 1949. (641158.)

24689. British Thomson-Houston Co., Ltd.—Porcelain glaze compositions. 21st September, 1948. (640872.)

24794. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Photo-electric systems for reproducing electrical waveforms. 12th May, 1949. (640874.)

24798. British Thomson-Houston Co., Ltd.—High-voltage capacitors. 22nd September, 1948. (640875.)

24808. General Electric Co., Ltd., and Vickers, A. J.—Apparatus for removing the outside covering from electric wires and cables. 7th November, 1949. (641067.)

25469. Pattison, G. R. B., Duce, G. W., Danby, F. D., and Maclaren, H. D.—Electric lamp connectors. 30th September, 1948. (640888.)

27210. Smith, C. G.—Electric secondary batteries. 14th October, 1949. (640889.)

31097. Sperry Corporation.—High-frequency electron-discharge tube structures. 9th October, 1942. (Divided out of 640895.) (Addition to 581983.) (640981.)

31663. British Insulated Callender's Cables, Ltd., and Howis, C. C.—Joint for electric cables. 6th December, 1949. (640890.)

1949

10752. British Thomson-Houston Co., Ltd. — Refrigerator cabinets. 22nd April, 1949. (640892.)

Lighting in the "Brabazon"

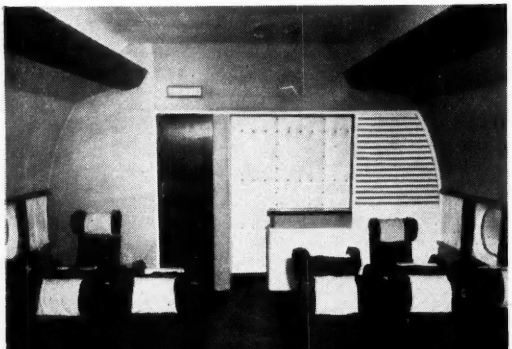
High Frequency Equipment

THE General Electric Co., Ltd., has supplied the fluorescent lighting equipment for tne section of the fuselage in the Bristol "Brabazon I" research aircraft that has been furnished as a passenger cabin, with cocktail bar. This is the only part of the fuselage equipped for passengers, the remainder being occupied by apparatus associated with the flight trials of the aircraft. The "Brabazon" made its first landing away from Filton, Bristol, on 15th June, when it visited London Airport, and later made demonstration flights.

The lighting in the passenger section is indirect, the lamps being mounted end to end above copper troughs on each side of the cabin. Each trough runs the whole length of the cabin, is about 22ft long, and is arranged so that most of the light is reflected from the ceiling, but a proportion is directed on to the sides of the cabin. The undersides of the troughs are pierced with ½in dia. holes at 6in centres to provide decorative relief in the otherwise plain metalwork. Eleven "Osram" 2ft 20W "warm white" lamps are mounted above each trough, and three similar lamps are installed in a concealed position behind the bar for lighting the counter and shelves.

Two rotary invertors are installed to convert a 28 V d.c. supply available in the aircraft to 110 V, 400 c/s for the fluorescent lighting. The 400 c/s frequency enables a resonant starting circuit to be used for the lamps, so that the gear associated with each lamp is confined to a control choke and starting capacitor. Another advantage of the high frequency for an aircraft installation is that chokes of small dimensions can be used, and in the "Brabazon" installation the very compact G.E.C. toroidal type of choke has been adopted. These weigh only 4 oz each, compared with the 2 lb of a normal general service choke for a 110 V, 50 c/s supply. All chokes and capacitors are concealed above the lighting troughs, but are readily accessible for inspection and servicing.

The illumination from the fluorescent lamps, as measured in the centre of the cabin, is 10 to 12 lumens per sq ft. Tungsten lamps are installed above the troughs so that light is available for maintenance work without it being necessary to run the invertors for the fluorescent lighting.



G.E.C. fluorescent lighting in the passenger cabin of the "Brabazon"

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—VICTORIA.—13th September. State Electricity Commission. 66 kV to 22 kV transformers. (See 16th June issue.)

QUEENSLAND.—9th August. State Electricity Commission. 6,600 V switchboard. (C.R.E. (I.B.) 55450/50. Ten/1341.)*

Belgium.—BRUSSELS.—5th July. Regie des Telegraphes et des Telephones de Belgique. Telephone equipment and accessories. (C.R.E. (I.B.) 56532/50. Ten/1365.)*

Cornwall.—30th June. County Council. Electrical sub-contract in connection with new infants' schools at Newquay and Saltash. County architect, County Hall, Truro.

Coventry.—5th July. Housing Committee. Electrical installations in 453 dwellings. (See 16th June issue.)

12th July. City Council. Electrical installations in 312 flats. (See this issue.)

Egypt. — CAIRO. — 3rd September. Three 250 kW diesel alternators for Suez refinery. (See 16th June issue.)

Ennerdale (Cumberland).—Rural District Council. Electric wiring of 310 houses. Surveyor, Council Chambers, Cleator, Cumberland.

Frimley and Camberley.—10th July. Street lighting tungsten filament lamps. (See 16th June issue.)

Grantown-on-Spey.—1st July. Town Council. Electrical work in connection with the erection of twenty traditional houses. J. D. Gibson & Simpson, 60, Frederick Street, Edinburgh.

Ilford.—26th June. Corporation. Street lighting equipment. (See 16th June issue.)

Merton and Morden.—30th June. U.D.C. Electrical installation, Central Library. (See this issue.)

Morpeth.—Town Council. Electrical installations in 57 houses in Spelvit Lane, Morpeth. Borough engineer, 36, Bridge Street.

Northfleet.—5th July. U.D.C. Pump and electric motor at the sewage works. (See 16th June issue.)

Pakistan.—KARACHI.—1st August. Department of Supply and Development. Six 500 kW diesel alternators and two 1,000 kW diesel alternators for Cittagong power station. (C.R.E. (I.B.) 56054/50. Ten/1360.)*

Penicuik.—30th June. Town Council. Electrical work for thirty houses at Eastfield Morham & Brotchie, 29, Hanover Street, Edinburgh.

Rhondda.—1st July. U.D.C. Duplicate set of pumps, electrically driven, to pump water from a suction tank to an elevated reservoir. Water engineer, Water Offices, Pentre.

Rochford.—3rd July. R.D.C. Installation of electricity in sixty-seven dwellings at Rochford, Great Wakering and Barling Magna. Surveyor, Council Offices.

Stretford.—15th July. Town Council. Street lighting cables. (See this issue.)

Surrey.—17th July. County Council. Street lighting at Egham. (See this issue.)

Tasmania.—1st August. Hydro-Electric Commission. Automatic valves for Tungatinah pipelines. (See 16th June issue.)

Willesden.—Borough Council. Firms wishing to be placed on a list of approved contractors from whom tenders will be invited for heating, steam services, laundry and kitchen equipment and electrical installations, should apply to the borough engineer and surveyor by 26th June. (See 16th June issue.)

ORDERS PLACED

Blackpool.—Corporation Estates and Housing Committee. Electrical installations in houses, Bloomfield Road, Blackpool (£137).—Nelson Bros. (Blackpool), Ltd.

Glasgow.—Corporation Cleansing Committee. Twelve traction batteries (£4,806).—Tudor Accumulator Co.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aldershot.—Factory, North Lane; H. Comoy & Co., Ltd., 72, Rosebery Avenue, E.C.1.

Brentford.—Factory extensions for Brentford Soap Co.; Dodge & Reid, architects, 72, High Street.

Brighton.—Factory, Hollingbury Light Industrial Estate, for T. J. Rogers & Son, Ltd.; A. Alldritt, builder, 79, Church Road, Hove.

Canterbury.—Additions and alterations to Marlowe Theatre, including new fully equipped stage block with dressing rooms on three floors; L. Hugh Wilson, city architect, Municipal Buildings.

Cardiff.—New pavilion at Sophia Gardens (£55,000); city engineer.

Chelmsford.—Milk processing dairy, Coval Lane; Chelmsford Star Co-operative Society, Ltd., 220, Moulsham Street.

Crawley.—Factory; Vitamins, Ltd., 23, Upper Mall, London, W.6.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Darlington.—Engineering buildings and applied science blocks at Darlington Technical College; borough architect, Central Buildings.

Houses (24), Haughton South site; J. W. White, Ltd., builders, High Barnes Works, Sunderland.

Eastbourne.—Houses (172) and 24 flats, Chatfield-Davis estate; borough engineer.

Ebbw Vale.—Houses (56), Hill Top site; U.D.C. surveyor.

Eccles.—Houses (46), Ellesmere Park site; Geo. Wimpey & Co., Ltd., Eccles.

Edinburgh.—Cinema (£35,000); Poole's Entertainments, Ltd., Synod Hall.

Enfield.—Flats (32) and houses (34), Cedar Road; U.D.C. surveyor.

Offices and canteen, Bullsmoor Lane; Broome & Green, Ltd., Covent Garden Market, W.C.2.

Evesham.—Extensions to grammar school; G. Foster, Leamington Road, Broadway.

Exeter.—Secondary modern school for boys, Ringswell Avenue; city architect.

Falkirk.—Houses (52), Langless and Carronside Street sites (£68,560), for T.C.; burgh surveyor.

Felinfach.—Offices, creamery, etc. (£100,000); Milk Marketing Board, Thames Ditton, Surrey.

Glasgow.—Out-patients' block, North Portland Street, for Board of Management of Royal Maternity and Women's Hospitals; J. Methven, secretary to the Board, 86, St. Vincent Street, Glasgow, C.2.

Four-storey extensions to offices, etc.; James Buchanan & Co., 44, Washington Street.

Factory, Middlesex Street and Scotland Street; Thomas Porter & Son (Glasgow), Ltd.; 153, Seward Street.

Flats for single persons (61), Calfhill Road, Pollok, for T.C.; director of housing, 20, Trongate.

Grimsby.—Crematorium (£48,820) for T.C.; J. V. Oldfield, borough surveyor, Municipal Offices, Town Hall Square.

Guildford.—Pathological laboratory (£25,000), St. Luke's Hospital; South-West Metropolitan Regional Hospital Board, 76, Wimpole Street, W.1.

Hemsworth (Yorks).—Engineering factory, South Kirkby Industrial Estate; Robert Thornton, Ltd., staple and wire manufacturers, Cleckheaton.

Hereford.—Office block, Mortimer Road, for Painter Bros., Ltd.; Scriven, Powell & James, architects, Hereford.

Hove.—Flats, Hangleton Road (36), and St. Helens estate (156); borough engineer.

Hull.—Central ambulance station, Little Park Street; city architect.

Huyton-with-Roby.—Houses (96), St. John's Road East; H. K. Pilkington, surveyor, Urban Council Offices, Derby Road.

Hyde.—Dairy at Dukinfield Road for United Co-operative Dairies, Ltd.; C.W.S. Architect's Department, Balloon Street, Manchester.

Ilford.—Modern school for girls, Grove Road, for T.C.; K. F. B. Nicholls, town clerk, Town Hall.

Kingston-on-Thames.—Omnibus garage for London Transport Executive; W. H. Gaze & Sons, Ltd., builders, 23, High Street.

Liverpool.—Factory for Sam Weller, Ltd.; city architect.

Loddon.—Secondary school (£80,000) for Norfolk E.C.; A. F. Scott & Sons, architects, 23, Tombland, Norwich.

London.—Science hall, South Kensington (£450,000); B. H. Peake, architect, 13, Dover Street, London, W.1.

BRIXTON.—Public laundry and slipper baths, Kennington Road; Lambeth borough engineer.

Macclesfield.—Houses, Ivy Road estate (334) and Hurdsfield (254); borough architect.

Melksham.—Secondary modern school, Shurnhold, for Wilts C.C.; county architect, Trowbridge.

Nottingham.—Factory on 8½-acre site; Raleigh Industries, Ltd., Lenton, Nottingham.

Ormskirk.—Mental hospital; architect to Liverpool Regional Hospital Board, Alder Hey Hospital, Eaton Road, Liverpool.

Oswestry.—Primary school for Salop C.C.; T. Lowe & Sons, Ltd., Curzon Street, Burton-on-Trent.

Pontefract.—Block of 14 shops with flatted accommodation over, Chequerfield estate; J. F. Rook, town clerk, Municipal Offices.

Portsmouth.—Divisional police headquarters, Cosham; R. A. Thomas, architect, Beresford, Northern Road, Cosham.

Ross (Herefordshire).—Houses (40) for U.D.C.; F. E. C. Davoll, architect, Town Hall, Ross.

Rugby.—Two schools at Newbold; C. H. Elkins, county architect, County Buildings, Warwick.

Stockton-on-Tees.—Factory additions for Horsfall, Garnett & Co., North Tees; G. Dougill & Son, builders, Chestnut Street, Darlington.

Stoke-on-Trent.—Two schools, Mill Hill (£115,500) and Springfield (£107,000), for E.C.; W. A. Bott, borough surveyor, Town Hall.

Wednesbury.—Works extensions for William Mills, Ltd., Friar Park Road; W. J. Whittall & Sons, Ltd., builders, 132, Lancaster Street, Birmingham.

Radio-Controlled Launch

DESIGNED as a high-speed sea-going bombing target for the R.A.F., a radio-controlled motor launch was demonstrated off the Isle of Wight on 14th June. It receives orders, within a range of eight miles, by means of different audio frequency tones which modulate a carrier frequency transmitted from the parent vessel. Five push-buttons on a mobile control unit enable the operator to start and stop the engines of the launch, open and close the throttles and turn on the lights. A rotary switch geared to a compass card is for steering to port or starboard. The launch was built for the Ministry of Supply by Vospers, Ltd., of Portsmouth, and the radio control equipment was designed by British Electronics and Marine Equipment, Ltd., of Hythe, Southampton.